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1850.

239 Twelve Lectures on the Form and Action of the Horse: to which are appended, some experimental inquiries into the Effects of Medicine on Horses, comprising those of most of the mineral and vegetable poisons. By **William Percivall,** M.R.C.S. and V.S., Veterinary Surgeon in the First Life Guards; Licentiate of the Apothecaries' Company; Author of "The Anatomy of the Horse"; "Hippopathology," etc.

"La forme du Corps Vivant lui est plus essentielle que la matière."—CUVIER.

London. 1850.

8vo. The Lectures on the Form and Action of the Horse occupy 160 pp., and "The Effects of Medicine on Horses" 75 pp. 8 engravings on steel by Joseph Lawrence, M.R.C.V.S., H.E.I.C.S. M., $8\frac{3}{4}$ in. by $5\frac{3}{8}$ in.

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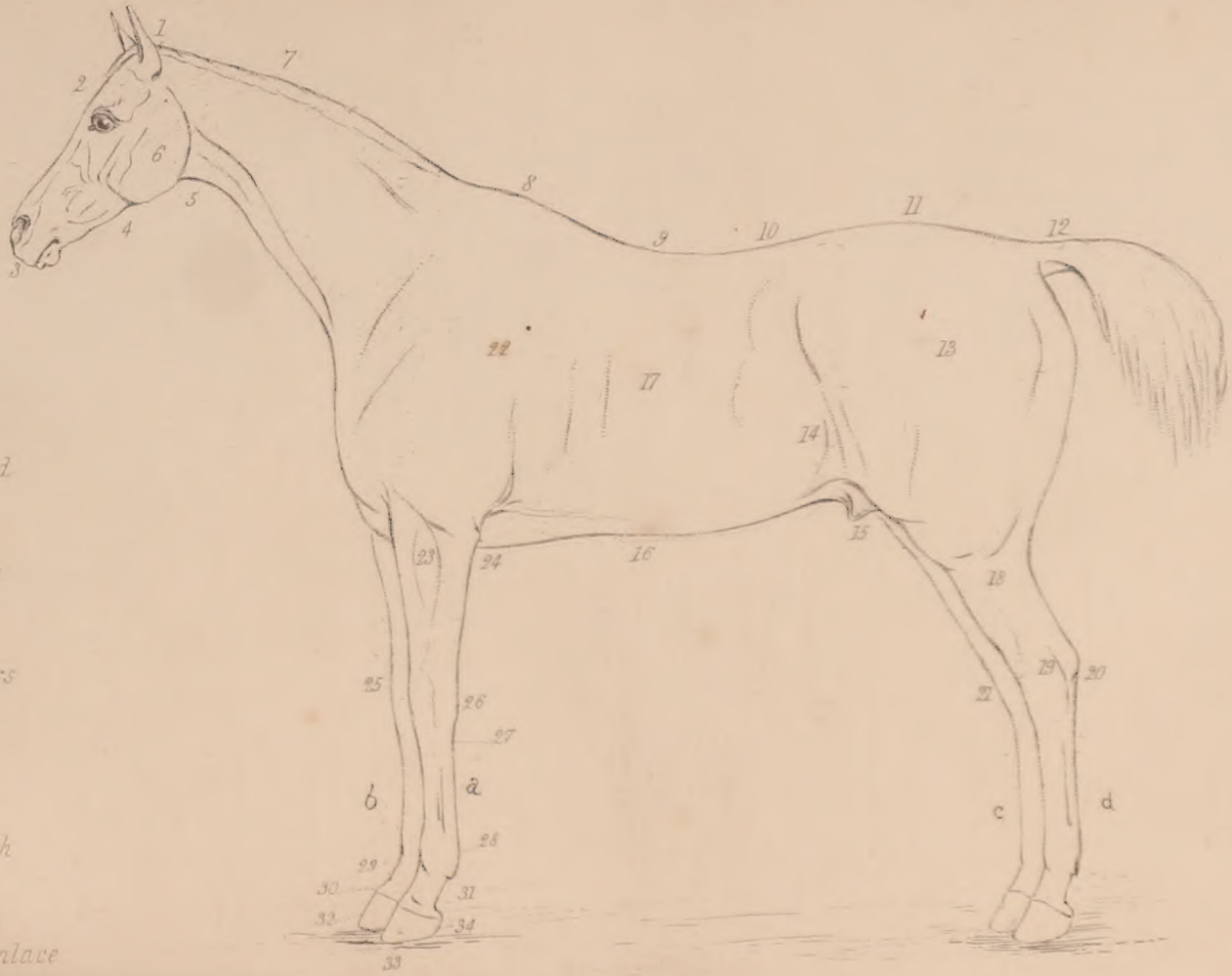

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30. Coronet
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33. Sole of Hoof
34. Heel of Hoof

TWELVE LECTURES

ON THE

FORM AND ACTION

OF THE

HORSE:

To which are Appended,

SOME EXPERIMENTAL INQUIRIES

INTO THE

EFFECTS OF MEDICINE ON HORSES.

(COMPRISING THOSE OF MOST OF THE MINERAL AND VEGETABLE POISONS.)

By WILLIAM PERCIVALL, M.R.C.S. & V.S.

Veterinary Surgeon in the First Life Guards;
Licentiate of the Apothecaries' Company;
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WITH EIGHT ENGRAVINGS ON STEEL,

BY JOSEPH LAWRENCE, M.R.C.V.S.
H.E.I.C.S.

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ADVERTISEMENT.

These Twelve Lectures were originally written for "*The Veterinarian*," in which journal they were serially published in the course of the years 1842-3-4. Additional copies of them were struck off the press at the time of printing: the same are now republished in the present form; the only alteration they have undergone—were, indeed, capable of undergoing—being the addition of some representations of the figures of horses, the intention of which is, to exhibit, in outline, the different parts composing the exterior of the body and limbs of the animal, to shew their relative situation and connexion, and to throw some light on the various movements resulting from their reciprocity of action. In the absence of any systematic treatise on this comprehensive and inviting subject, it is hoped these "Lectures," roughly and runningly sketched as they have been, may induce persons engaged among horses to bestow some reflection and study on a branch of science which too many are apt to suppose comes of necessity to them (as it were through instinct) with the possession of a horse. Moreover, it is conceived that, at a future day, they possibly may prove useful to some writer or lecturer about to undertake the exposition of the principles upon which the science of external conformation, and its consequent, action, is or ought to be founded. The observations appended "*On the Effects of Medicine*," grounded on some experiments made, many years ago, by the author's late father as well as by himself, have likewise appeared from time to time in "*The Veterinarian*." There being no possibility of correcting the sheets composing the work now, the author prefers craving for their *errata* the indulgence of the reader to the publication of any—which might turn out to be a lengthy—catalogue of them.

36, Gloucester Crescent, Regent's Park,
August 1850.

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In Veterinary and Equestrian Science

France and Germany, and, perhaps, Italy too. We have several modern books on veterinary medicine—we have some on anatomy; but we lack one on what is commonly called "Exterior Conformation:" this want I propose to use my humble endeavours in the present lectures to supply.

Animal bodies have been compared to works of art—to machines and engines of various descriptions. Such comparisons, at the same time that they manifest their boundless inferiority to their great prototype, have still had their use in serving to explain and elucidate the structure and operations of that most curious and delicate and wonderful of the productions of Nature,—an

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LECTURES ON HORSES.

LECTURE I.

FORM AND ACTION.

"A horse! a horse! my kingdom for a horse!"

WHEN Richard in the heat of battle made use of this soul-stirring exclamation, I take it he wanted a horse with form, and fire, and action, such as England alone, no less perhaps in those days than the present, could furnish him with. In what other part of the world could the *Hotspur* spirit of Richard have been suited? or where could he have met with an antagonist well enough mounted to have required such a steed to oppose him with, save in Britain? Exists there in any other country cavalry equal to our own? Can a horse of any foreign breed out-run the English racer? Acknowledgedly in possession of the finest and fleetest horses in the world, is a proof—and a pretty convincing one—that our management concerning them, in a practical point of view, has attained a degree of eminence of which we may justly feel proud; and yet in veterinary and equestrian literature we appear to be behind France and Germany, and, perhaps, Italy too. We have several modern books on veterinary medicine—we have some on anatomy; but we lack one on what is commonly called "Exterior Conformation:" this want I propose to use my humble endeavours in the present lectures to supply.

Animal bodies have been compared to works of art—to machines and engines of various descriptions. Such comparisons, at the same time that they manifest their boundless inferiority to their great prototype, have still had their use in serving to explain and elucidate the structure and operations of that most curious and delicate and wonderful of the productions of Nature,—an

animal machine. Simple and uniform, and beautiful in appearance, as are the exteriors of Nature's organic creations, their interiors are in truth, in the sublime language of the psalmist,

"Fearfully and wonderfully made!"

Such is the complexity and intricacy of the animal fabric, that, notwithstanding men of the greatest sagacity and spirit of research have, from the earliest ages, laboured in developing and explaining it, there still remain parts of the body whose structure is concealed in mystery; and as for the connexion subsisting between body and mind, anatomists and physiologists of the present day are hardly more informed than were the metaphysicians of former ages.

"Through the dis-closing deep
Light my blind way: The mineral strata there
Thrust blooming. Thence the vegetable world,
O'er that the rising system more complex
Of animals, and higher still the mind."

Whenever a man has elaborated any complex or delicate piece of machinery, in order to preserve it he incloses it in some sort of case: in this he does but imitate Nature, who has furnished all her organic productions with complete tunics or cases—some of one kind, some of another, but all pleasing to view, and most completely effectual for the purpose of protection against such external agency as must of necessity be encountered. This covering—commonly called *skin*—is that which composes the *exterior* of the animal. But Nature does not stop here. In addition to a skin she has given a sort of clothing to animals: some she has covered with scales, some with feathers, some with wool, some with hair. From the observations Lord Byron made in the course of his travels and residences abroad, he was led to believe that even the hair of the head of a woman, if suffered to grow to its natural length, would in time serve as a vesture for her body. Man, in a savage unclothed state, would no doubt appear in some such natural pilous garb as that in which Orson is pictorially represented.

There is not only a difference in the material furnished by Na-

ture as a clothing for animals, but there is an evident difference in the quality or texture of the same material, according to the breed or variety of the species: compare the coat of the cart-horse with that of the racer, or rather contrast it with the satin dress of the Arabian, and this difference will at once be manifest. Though there are, however, these striking and obvious distinctions as regard the species, a great deal concerning texture or quality of coat depends upon climate, soil, domestication, &c.

The outward form of the animal is regulated by the construction of the interior of its body; and since we take this in all cases to be that which is best suited to answer the ends of its creation, it follows that no other form or shape for that peculiar to the animal could have been substituted. The form of the fish is that best adapted for suspension and swimming in water; that of the bird for suspension and flying in air; that of the quadruped for fleetness, or for travelling under heavy burthens upon land; that of man in his capacity as

"Lord of the creation."

But form admits of division into *size* or *magnitude*, and *shape* or *symmetry;* and as we have seen that the shape of every animal is that which proves most conducive to its design, so we shall find on investigation that the *size* of the animal, so far from being an affair of chance or accident, has likewise been considered. The animal creation presents examples of every conceivable variety and degree of magnitude—from the mite, discernible only through the microscope, to the stupendous elephant and astounding whale. Shall we call this a freak of Nature? rather, shall we not discover in it *design?* yea! and design most ingeniously worked out to answer the various ends for which the different creatures were created. Was not the elephant made of gigantic size in order that he might possess surpassing strength, to enable him to travel under enormous burthens? On the other hand, was not the mouse formed diminutive to render it light and agile, and apt to run into holes, and chinks, and corners, to elude its pursuers?

This brings us to the consideration of a law of Nature regarding magnitude,—that great bodies move comparatively slowly or with difficulty—a law which, though not strictly measurable by an arith-

metical scale, is nevertheless one that, in the animal kingdom, will be found pretty generally to apply. Compare the tardy and tedious march of the elephant with the nimble-footedness of the mouse; the sluggish walk of the cart-horse with the amble of the pony; the heavy step of the grenadier with the light active trip of the little man of business; and in every instance there will appear some exemplification of this law. Is not this enough to shew that the height and bulk of animals has not been a mere affair of chance or accident, but a principle of design for wise and benevolent purposes? Is not the large cart or dray-horse as useful a creature in his way as the racer or the hunter, the cob or the pony? Could any one of these completely supply the place of the other? Could the racer drag the brewer's dray?—the dray-horse run the racer's course?—the pony carry the cob's twenty-stone weight? It is, now-a-days, notorious enough among "judges of horses," that size and bulk are indispensable for the carriage of heavy weight and for the draft of heavy carriages: a slender-made horse, however intrinsically good he may be, cannot perform in such situations.

We must take care, however, not to run away with the impression that, in animal structure, capacity, or what is called "goodness," increases in direct ratio with greatness. When it does—which is only now and then—nothing short of the same size and volume can prove equivalent to it. Every horseman well knows that "a good big horse" will always beat a good little or less horse, the difficulty being to *find* the former. Everybody has a good pony. There hardly ever was known a bad one. But how few persons have possessed good sixteen or eighteen-stone-carrying hunters! Our best racers and hunters have all been *great* or *big* horses—horses 15..2 or 16 hands high, and large in proportion. Need I mention the names of Selim, Reubens, Castrel, Sorcerer, Soothsayer, Voltaire, Charles XII, Middleton, Velocipede, Camel, and, last and greatest of all, Harkaway?* or need I say to my reader,—"go into Leicestershire, and look at the hunters there, and you will see my observations amply enough verified!" So that, when goodness is combined with greatness, perfection is nearer approached than in any other form.

* The following mares were equally remarkable for size and excellence:—Altisidora. Fleur-de-Lis. Queen of Trumps. Crucifix. and Orelia.

When I speak of largeness or bulk, I am not meaning *fatness*: a fat horse is a proportionably weak horse. *Adeps*, or fat, is an oily matter, itself unendowed with life or sensibility, contained in cells, as honey is within the honey-comb, which are vital, and so endowed that they have the power either of adding to or taking from the quantity of oily matter at any time existing. The use of fat is to fill up crevices in the body, facilitate the movements of parts one upon another, and serve as a sort of internal nutriment, in case the animal should be in a situation where he cannot obtain food: but, when it accumulates, instead of facilitating the motions of parts, it clogs and impedes them, and becomes, from its collected amount of weight, a burthen to the body. A fat horse is not only unfit to go, but really has a weight within himself to carry which the horse in condition for work has been disencumbered of. A fat horse will not bear the loss of blood the same as a horse in a working state of body; the one will faint from the abstraction of a quantity which the other will stand without being affected. Plumpness, which arises from fatness, is too apt to convey to the eye of the inexperienced the impression of strength and ability to go to work; whereas it ought, I repeat, be taken as a proof to the contrary. When a purchaser enters a dealer's yard to buy a horse, every horse shewn him, most likely,—certainly every horse four or five years old,—is fat, and therefore not in a condition for work. Dealers, by quantities of manger-meat, bruised oats, hay-chaff, &c., and by giving their horses only such little walking exercise as serves to keep their legs from filling, make the horses they have for sale as fat as they can, and for two reasons:—1st. Fat fills up the crevices, and conceals any imperfections there may be of outward form: it is the horse-dealer's putty; by it, like the coach-maker, he makes his article for sale appear more perfect, or freer from defects, than it really is.—2dly. By it he gives an appearance of size and bulk to the articles, which passes for signs of strength and ability, but which, as I said before, is in reality an indication of weakness. No men are better aware of the disadvantages arising from the presence of fat than trainers and jockeys. "Such a horse is too fat to win his race," is a remark not seldom heard, even at the starting-post on the race-course; when all signs of obesity, it is expected, have—or most assuredly ought to have

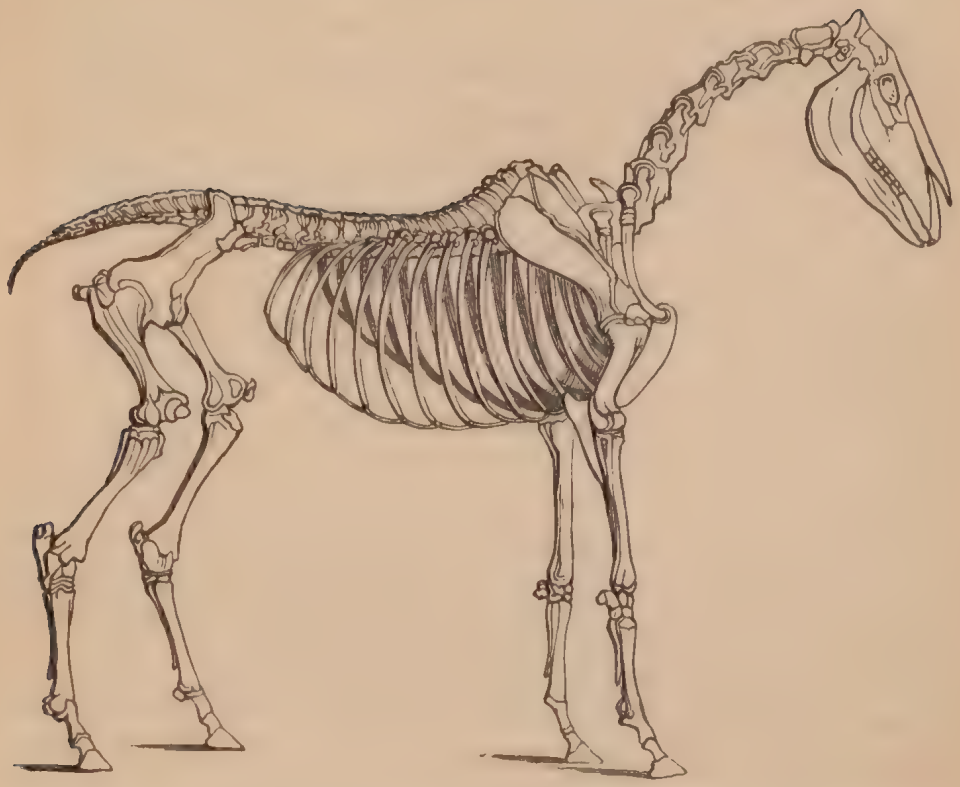
—vanished. How many hunters are there distressed—shall I say killed?—at the beginning of the hunting-season, or before Christmas, to what there are afterwards! A "judge," going to view a hunting stud, feels the horses upon the ribs and along their crests, and pronounces, at once, one to remain too "gross" or fat, another to have been over-reduced: his experienced eye and hand telling that in the stable which to another only becomes discoverable on actual trial.

In young horses, the *adeps* or fat is mostly deposited upon the external parts,—upon the superficial muscles,—and is, consequently, found immediately underneath the skin; but horses seven or eight years old, and upwards, are very disposed to accumulate fat inwardly—about the kidneys and bowels, and upon the belly, internally. A horse may evince very little fatness outwardly, and yet be loaded with fat "in his inside." Fatty matter deposited among the fleshy parts or *muscles* of the body, and between their fibres, renders them loose in texture and flabby in feel; the adeps occupying that space which, in the horse in hard condition, is filled with clean muscular fibre.

The good great horse is not made up of fatty substance. He has large bones, large joints, and large muscles; and in these, and these alone, consist his superior physical powers. This skeleton is of large dimensions. There is evidence, in the length of the bones and in their bold and prominent projections, of considerable leverage. The muscles distributed upon it have evidently had every advantage of action, their further power depending entirely upon their own innate bulk and composition.

The time is now arrived for us to take a view of the fabric and mechanism of

THE SKELETON OF THE HORSE.



The bones of which the body is composed, divested of their flesh or *muscle* and other soft parts, and connected together in their natural order, constitute the skeleton or osseous fabric of an animal: to this the fleshy parts are attached, by it the bowels are supported and protected, and from different parts of it project levers, by whose means, through the agency of the muscles or moving powers, *locomotion* is performed.

The contemplation of the skeleton of the horse—or, indeed, other quadruped—presents to the mind a figure too irregular to admit of any comparison save to the animal of which it once formed the framework. It is constituted of a part we call *the body*, but which is strangely deficient about the loins; supported by four columns *or legs;* and has attached to it, in front, *the neck and head;* behind, *the tail.* This is the view the superficial observer might take of the skeleton; but it is not the view which will answer the ends of science, or convey to our mind those notions of its fabric upon

which must be founded our philosophy of its uses and operations. Let us commence at the *occiput* or hind-head, and we shall find a continued chain of bones, termed *vertebræ*, extending from it, forming the bone-work of the neck, and back, and loins, and tail: altogether—comprehending its entire line—having something the figure of a double *ff* turned lengthwise and united, in this manner:—

An artist would say, "Why this is precisely the superior outline of a horse." *We* must regard it as the *key-stone* of the edifice—the great bond of union of the two sides or halves into one whole. It is the most important part of the structure. It is composed of no less than thirty pieces, called *vertebræ*:—seven in the neck, eighteen in the back, five in the loins, with the addition of the croup and the tail; and these are united one to another by an elastic gristly substance, to the interposition of which is ascribable that pliancy and flexibility which the *spine*—for so this chain of bones is called—in the living animal is known pre-eminently to possess. The sinking down of the back under the imposition of weight at the time that the rider mounts—the springy and easy seat the rider finds in the hollow or middle of the back, and the self-adjusting power of the spine to the various inflexions of the body, are all attributable to this property of elasticity which the vertebral chain derives from its thirty gristly inter-layers. Supposing it had been from beginning to end one undivided piece of bone, what would have been the consequence! Why, that the animal could have possessed no flexibility either in his neck, back, loins, or tail, and must, therefore, have moved about upon his legs, stiff in all these parts, as though he were affected with *tetanus* or locked-jaw. As it is, there exists a little yielding, a very little, between every two vertebræ; but this, multiplied by the number of the vertebræ,

gives, as an aggregate, to the entire spine a very considerable extent of flexibility. There is, perhaps, no occasion on which this flexibility of the spine is better seen than at the time a horse is twisting his head round to bite himself, or scratch his cheek with his hind foot, unless it be in the remarkable bending evinced by an ass at the time he crawls under a low rail.

The figure the spine describes in its course is that, imperfectly, of a double S, or of two *ſ ſ* of unusual lengths, placed horizontally, and united thus . There appear two arcs formed by it, one at the upper part of the neck, another commencing in the back, behind the blade-bone, and running through the loins and croup to the tail. These, therefore, we may take to be the most resisting parts of the structure—the parts most capable of bearing superincumbent weight. In some horses these arcs are more conspicuous than in others. In horses with crested necks and roach backs they are most so; and such horses, on this account, are reckoned strong and able to carry a greater load. There can be no doubt but that roach-backed horses evince the greatest power under the riders: I have experienced it myself on many occasions. It is likewise, I believe, equally true that curved or crest-necked horses have augmented power in their necks.

An attentive consideration of the figure of the spine will shew the proper place for the seat of the rider: this obviously must be the part where the animal can best support his burthen, and yet not have his action in progression at all impeded. English horsemen are apt to sit in too forward a situation upon their horses; foreigners —Germans in particular—too backward. The saddle should be placed backward enough not to interfere with the motions of the shoulder-blade, and forward enough for the pummel to meet the rise or summit of the withers; the girths crossing at a sufficient distance behind the elbows not to rub against or fret them in action. In the living horse there is a dip in the back, greater or less, immediately behind the withers; a place the rider upon the bare back naturally slips into for ease and comfort, and particularly if he happen to be mounted upon a rough trotter. This, Nature seems to say, is the place for the saddle.

We have looked at the arcs or arches of the spine; let us now

take a view of the *dips*, or reversed arcs. There is but one, but it is a very remarkable one. It commences at the lower part of the neck, extends backward through the interspace between the shoulder-blades, and terminates where the spine emerges from behind the blade-bones. This must be the weakest part of the spine; and for this reason Nature has placed it in a situation where it cannot possibly have to support any burthen. No man ever dreamed of riding upon the summit of, or in front of, the withers. This remarkable dip, or downward curve, appears to owe its existence to the two arcs afore-named. Had the spine been constituted of one continued arc from end to end, the head must have been inflected downwards, without the power of elevation; vision no longer could have proved useful in directing the animal on his way; the back would have been of a most awkward form for the carriage of burthen; the cavities of the chest and belly of a most inconvenient shape and the limbs of enormous length. Had the spine been made straight from head to tail, no elongation of it, and with difficulty any shortening of it, could have been produced, the consequences of which must have been a great diminution of that elasticity and power of adjustment for which, in its present form, the structure is so useful and admirable. The beauty of the neck, the freedom of erection and depression of the head, the faculty of looking back and turning round with equal facility and rapidity, would all have been greatly impaired by a spine either directly straight or uniformly curved: in addition to which, none of the actions of the body, in particular galloping and leaping, could possibly have been performed with the same efficiency they are at present.

The arc of the spine forming the loins and croup is completed posteriorly by the tail, which, when of its natural length, considerably extends it, both backwards and downwards. Then here is another part upon which weight may be imposed with great advantage to the animal: the tail itself will assist in its maintenance, let alone its being placed immediately above the hind limbs or posterior columns of support; and the destruction of this arc, when the burthen is intended to be borne by it, forms, there cannot be a question, a decided objection to docking. Asses, we know, with

great apparent facility, and comparative ease, carry their loads upon their croups: docking, one would think, must tend to render this carriage difficult.

The *vertebræ*, or bones composing the spine, are exceedingly irregular in their figure, and remarkable principally on account of protuberances and projections growing from their sides and superior parts. The superior projections are conspicuous for their length, particularly those forming the withers. In fact, it is the length of these processes that regulates the height and fineness of the withers. Altogether, the protuberances and projections may be regarded as constituting a series of levers for the attachment of muscles, many in number and great in power, on which mainly depends the strength in action of the animal, as well as his capability as a beast of burthen.

I have already observed that the motions, although exceedingly limited between any two vertebræ, are pretty extensive in the entire spine, owing to the number of its component pieces. The spine was required to be a very strong and resistant structure; at the same time it was required to have the power of flexure and curvation, in order to accommodate itself to the various positions and movements of the body during progression; all which could not have been effected in the same piece of mechanism without a manifold division of its component parts. Whenever the motion between two bones is of an extensive or varied character, the liability to *dislocation* or displacement between them becomes great: the more completely the bones are locked or dove-tailed together, the more limited becomes the motion between them, but the more secure they are against liability to dislocation. Such is the admirable mechanism of the spine, that both these *desiderata* are insured.

THE BACK AND LOINS.

"The back of a horse, to be a good one, should sink a little below the withers, but the other part should never be too low, but always straight. When the back is higher behind than forwards, he is apt to be pinched in his shoulders, which makes him both weak and unsightly; besides, his hind parts are rendered so heavy thereby, that he generally has an awkward clumsy gait, and moves but slowly. If a horse's back is too short in proportion to his bulk, and yet he is in other respects well built, he may hold out pretty well on a journey, but such are generally slow, and never make a good appearance; but if at the same time he is tall, and has very long legs, his worth is but trifling. If his back is a little arched behind the saddle, it is a sign of strength, and shews fitness both for hunting and travelling."—*Farriers' Dictionary.*

THE strength of arched structures is well exhibited in works of art. Wherever the architect requires great strength and resistance he adopts the form of the arch. Between the columns of spacious buildings he extends arches, by which their walls are rendered more secure, in being bound together, and their roofs better supported; and in the construction of bridges across waters of any extent, he employs an arch, or a succession of arches. That wonderful work, the Tunnel underneath the bed of the Thames, consists of a series of united arches of substance sufficient to resist the pressure of the superincumbent body of water, which at high tide is estimated at an almost incredible weight.

With all the strength and power of resistance of the architectural arch, the arcs of the spine possess a degree of mobility, enabling them to alter their figure, to become larger or smaller, elliptical or circular, according as circumstances require: a property that could not be given to the mechanical arch without rendering it unstable and detracting considerably from its strength. At the same time it is worthy of remark, that, wherever there is any elasticity arising either from the kind of materials of which the arch is composed, or from the nature of its construction, it is invariably found to possess, in consequence, increased powers of resistance. A happy elucidation of this is seen in the common violin, which, when strung up to concert pitch, has been calculated to be actually sustaining a force equal to eighty pounds; under the pressure of which it would certainly break were it not for its arched form and

the elasticity of the material (very old seasoned deal) of which it is manufactured.

From their mobility the arches of the spine not only derive the requisite elasticity, but likewise that self-regulating power which, under all changes, preserves their equilibration or undiminished strength. Dr. Hutton, in his "Principles of Bridges," tells us that the arch of equilibration, i. e. the one which is in equilibrium in all its constituent parts, is the only one which admits of a horizontal line across its top, and, in addition to being both graceful and convenient, possesses the advantage of being made higher or lower at pleasure, with the same span or opening. He adds, that the elliptical form of arch approaches the nearest to that of equilibration for strength and convenience. How strikingly and beautifully is all this verified in the fabric of the spine, and how wonderful it is that the structure should be capable of preserving its equilibration under all the various changes of figure and span which its arcs must, in the movements of the animal, be continually undergoing! Who but "the Divine Architect of the Body" could have framed and finished such a piece of workmanship?

It must be manifest that the mechanical powers of the spine, regarded either as a fixed or moveable body, must be affected by its length: and that there exist considerable variations in the longitude of spines, must appear self-evident to any observer of horses: not that there are any additional bones in a spine of unusual length; but that the vertebræ are of larger size, and their bodies and intervening cartilages thicker. Some horses have very long backs and necks; some very short ones. Hardly any two have backs and necks of the same length; from all which result certain advantages and disadvantages We will first consider the longitude of that part of the spine that forms the back, and in two points of view:—1st, as it affects the support of weight; 2dly, as it mechanically affects progression.

Regarding the dorsal portion of the spine with its super-imposed burthen as a pole or lever supported in front by the fore limbs and behind by the back limbs, after the manner of a barrel of beer or a sedan between its bearers, it is manifest that the greater its length the greater must be the leverage, and consequent reduction of the weight of the burthen. On this principle, the legs of

the long-backed horse are actually sustaining less load than those of the short-backed horse, even though their riders or burthens may be of equivalent weights, from the circumstance of their operating at a greater distance from the load.

But an important circumstance to be taken into consideration in the present case is the *flexibility* of the pole or lever—the fact of its being liable to *bend* under superincumbent weight, and of undergoing, in consequence, alteration in its figure, either from an arc to a straight line or to a reversed arc, whereby its mechanical powers become proportionably weakened. When a horse fails under too heavy a load, we do not find that it is the limbs that give way, but the spine. His back bends or *sinks* under the weight to the extent of its limits of flexibility, and then the limbs falter, and the whole machine succumbs. Did not the pillars of support yield either from Nature's warning, excessive pain, or from actual inability to sustain more, the spine would probably become fractured—not dissevered in its joints, for they are stronger than the bones themselves.

We now perceive the reason why horses with long and hollow backs are accounted *weak*. To a degree, they are so, beyond doubt: but it is a great mistake to suppose that horses for riding cannot be made too short in the back. Length in the back is attended with many advantages: the limbs have a lighter burthen to carry—the stride in progression will admit of being greater, and, providing the hind limbs have length enough to reach forward under the load, the facility of forward motion will be increased: the chief disadvantages of such increased longitude, in progression, being the inability of the hind legs to reach the proper fulcral points underneath the machine, and the operation of the additional length or leverage in turning. We often hear excellent practical judges of horses saying, "a horse must have *length* to gallop;" by which they mean *length of back*: and, providing the limbs are proportionate in longitude and power, the observation is one which experience will shew to be correct. How frequently do we meet with horses with long backs reported to be, not merely fast, but strong galloppers in heavy ground, and able to carry great weights. I have known even hollow-backed horses have this character. I remember a hunter belonging to Captain P—, of the Guards, one,

without exception, of the most hollow-backed horses I ever saw, and yet this horse, Captain P. who is

"A skilful horseman, and a huntsman bred,"

has, over and over again, assured me, was *in mud* a most capital horse after hounds; and, indeed, when we came to look at his points—when we perceived that he had loins broad and rounded, haunches fleshy, and thighs down to his hocks, it became no matter of surprise to learn that his powers, in spite of his hollowness of back, were so surpassing. Had he been made narrow and tucked-up in his loins, ragged in his hips, flat and thin in his thighs, and weak in his hocks, his hollow back would have proved an additional source of weakness to him, and rendered him, for all purposes where strength was required, all but worthless.

A short back is well adapted for the support of weight, and, from being combined with, as a sort of kindred make, broad loins and full hind quarters, is, with reason, regarded as a mark of strength: but it is disadvantageous for galloping. It will not admit of any great length in the limbs, for fear of their interfering with one another in action, or of one set over-shooting the other, and therefore, most wisely, it is combined with short legs, whose two strides amount to little more in extent than one of the long-backed horse's. Consequently, to keep equal pace, one horse must take three or four strides while the other is taking two. The short back is well suited to the dray or cart-horse, in whom we want not speed but strength; and strength not alone to bear burthen, but in draught. In heavy draught, in particular, length of body would prove disadvantageous to him, from the circumstance of the limbs being required to be longer and farther distant from each other, and from the step being greater than is compatible with the full concentration and co-operation of the bodily powers. The short step of the cart-horse or cob it is which enables him to husband and maintain his powers of strength while in action. A long step would, by the too great call upon those powers, tend to exhaust them; and, by repetition, render the animal incapable of proceeding with his load.

I have just observed that when the back is short the loins will be found to be broad and strong—what is called, good; a circumstance arising from the circularity of the chest and the breadth of

the hips—these four formations, viz., shortness of back, circularity of chest, breadth of hip, and strength of loins, generally being found in combination. It is a great matter that a horse should have good loins, and when these are associated with a long back, and the requisite length and substance of hind quarters, we may take it for granted that the animal possesses both speed and endurance. Look at hares and rabbits, greyhounds, deer, kangaroos, and such-like animals, and note what thickness of loins, and length and muscularity of hind limbs they all exhibit; while their fore-parts amount to hardly any thing in comparative substance. It is impossible that a horse with thin narrow loins can hold in his gallop: the moment he puts his feet in dirt, that moment will he fail. It is the good loin, as I said before, that can—and the only point that can—compensate for hollowness of back. The horse I quoted as, though hollow-backed in the extreme, being an extraordinary hunter, had one of the finest of loins; from which we practically learn that, when the loins are good, not length, nor even hollowness of back, are to be accounted objectionable points.

It is nonsense to pretend to prescribe that the back should be long or short, of this length or that; although we may, in a general way, fall in with the common description of what a back ought to be, and say, "that, to be a good one, it should sink a little below (behind) the withers, and then run straight." The back will be too long or too short, or (though, to the observer, of unusual longitude or shortness, still) of the proper length, depending upon the formation and dimensions of other parts with which, in structure and action, it is associated. A long back would ill accord with short legs, defeated in their operation—a short back would not require long legs, they would do too much for it. We have, therefore, long-backed horses and short-backed horses, and yet with backs of proper length: because the longitude, whatever it may be, is that which is the suitable length for the machine of which it forms a part. A very common, but not the less, on that account, reprehensible custom among "judges of horses," is to find fault with a point, without any reference whatever to the general or particular conformation with which that point is consorted. Abstractedly considered, it may be out of proportion; but considered, correlatively, with out-of-proportioned other parts in the same frame, it may be

in the best proportion, or of such proportion as serves to compensate for faulty dimensions in other parts. A part most faultlessly fashioned and proportioned may—placed among certain other ill-formed or out-of-proportioned parts—appear itself to be the faulty piece in the fabric. In an animal body, as in machines made by man's hands, the great object to be sought for is *harmony* between the constituent members: at the instant, we are not hastily to condemn any apparent disproportion, lest, on critical examination, it should turn out to have been given for the purpose of compensation—to make amends for some defective structure elsewhere, which may not at first sight have struck our attention.

LECTURE II.

THE NECK.

"With neck like a rainbow, erecting his crest."

THE neck being the part to which the head is affixed, and by which it is attached to the body and supported, its shape and proportions will necessarily admit of a good deal of variation, according to the size and setting-on of that appendage. Viewed in the skeleton, the neck appears a very slender and inadequate structure to support such a formidable and bulky substance as the head; and truly inadequate to such a burden would it prove, were it not in the living animal aided in its functions by two powers of considerable influence and importance—one *elastic*, the other *muscular*, in its nature. The striking difference in the aspect and volume of the neck in the anatomized and living animals, will shew how great is the proportion of soft parts—*ligament* and *muscle*—compared with the abstract osseous materials or component *vertebræ;* and when we come to consider the nature and economy of these soft materials, we shall find that hardly any of the weight of the head is actually borne by the *vertebræ* of the neck; although the bone here, as in other parts, must still be regarded as the framework and basis of the structure. So far, therefore, as the bone is concerned in the support of the head, it matters little what the form and dimensions of the neck may be; its length and figure and substance having reference chiefly to the operation of the muscular and elastic powers.

A neck disproportionately long will, according as it is well or ill carried, detract more or less from the symmetrical beauty of the fore parts: at the same time that it is operating in rendering the head more burdensome than if it were a shorter projecture from the body, on account of the increase of leverage. A favourite exclamation of Professor Coleman's was, "Give me a horse that will starve at grass;" thereby meaning, a horse having a neck so short that, from not being able to reach the grass, he was incapable, or nearly so, of getting his living by grazing. Such extreme and disproportionable shortness of neck, however, although advantageous in the light in which it was viewed by the Professor, viz. decrease of leverage, is on some other accounts by no means desirable. It is perhaps an objection to a horse with a very short neck, and legs at all long, that he cannot but with difficulty get his living by grazing; but a greater objection to such shortness is, that a horse so made can hardly by any training in the manege be made to ride well. The neck is too short and too thick—the two properties generally go together—to admit of the required flexion, and the consequence is, the head cannot, by any perseverance in reining or bitting, be drawn into its proper position. The horse will ride *piggishly*—go boring forward, perhaps with his nose out, and make that sort of continual dead pull on the hand that gives his rider the sensation of his inevitably falling down at the first blunder in action he happens to make. A horse's neck that is short is not only, commonly, broad and thick as well, but, moreover, is combined with strong shoulders, thereby rendering him a great deal more fit for the harness-collar than for the saddle: such shortness and thickness in the neck, and strength in the shoulders, being for harness attended with many advantages. The *bull-neck*, as it is called, is proverbial for strength, and strength of a kind which appears well adapted for draught. In Spain and Portugal the oxen are yoked to the bullock-cars by their horns, which by leathern thongs are lashed to the pole of the car; and thus, by strength of neck alone almost, do they move forward with their loads, and, to appearance, with as much facility and effect as though they were—as in our own country—in harness-collars. Nothing can demonstrate power in the neck better than this; at the same time that it shews us that the commonly received notion, "the neck should be *lean*," is erroneous.

Such thinness or leanness may prove admirably suited for flexibility, and be the means of the horse reining-in and riding pleasantly; but for every purpose of power, for endurance, for guarantee of bodily strength, a broad and muscular neck is a point to be sought after and valued.

But the neck may be long, and yet its carriage may be such as shall counteract any increase of leverage. In the horse "with a rainbow neck," although his neck may be by actual admeasurement equally long with that of another horse who carries his neck quite straight, yet will the leverage of the head be altogether different. It will be seen, on a review of the skeleton, that the lever, in a well-carried head, does not run in a line parallel with the neck, but extends diametrically across the curve of it; proving that the neck, though long, does not in point of fact—so long at least as it be well-carried—add any thing to the leverage.

There are circumstances, however, under which increased length with straightness in the neck, however inelegant it may be, appears even to be productive of advantage. It seems to me that the preponderance of the head in the forward direction must have some influence in facilitating progression at the time that the horse is flinging himself forward in his gallop with all his might; and in order that it may have this effect the more, he projects his head while galloping to the utmost, and inclines it to the ground. I know very well other ends are answered by this straightening of the neck and protrusion and declination of the head, but this nowise militates against the operation of the gravity of these parts in that sort of swinging or leaping action of which the gallop consists. This accounts for length in neck being considered desirable in a racer, and for his always making the most of it in running, carrying his head in that thrust-forward position that his muzzle is the foremost part: hence the report that a horse has won his race "by a nose" becomes literally correct. This demonstration of the utility of a long and straight neck reminds us once more that, in regarding the conformation of horses, it is our duty ever to bear in mind of what breed or kind they are, and for what purpose they are by nature or art intended. In a hackney, nothing is more unpleasant than a long neck so straightened that the rider in vain tries to rein the

head in; in a race-horse the same appears to be attended, in his speed at least, with advantage.

The most undesirable form of neck of all others is what is called *the ewe neck*. Very often this is a natural deformity, appearing to consist in extension of the dip or reversed arc* of the cervical portion of the spine: oftener, however, I believe, it will be found to owe its production to the harsh and fruitless efforts of art "to get the head up or in," when the neck is of that description that will not, naturally, admit of it. Such constrained erect position of the neck and head is not only exceeding unsightly, but is irksome to the horse, and to his rider as well, who has, by continual workings with his bridle-hand, to keep the head in this forced erect posture. It is of no use trying by bitting or riding, or any course of manege, to alter a natural ewe-neck: no pains or perseverance can ever render a horse so formed pleasant to ride.

THE HEAD.

"The head of a horse should be narrow, lean, and not too long; but the principal matter to be observed respecting it, is, that it is well united with the neck, that so the horse may be enabled to bring it into a good position: and the best position in which a horse can possibly hold his head is such an one as is perfectly perpendicular from the brow to the ground, so that, were a plummet to be suspended from that part, it would just raze or touch the nose. Every horse that has too large a head is apt to bear too hard on the bridle, which not only tires the rider's hand very much, but exposes both to several very disagreeable accidents; and, besides, a large headed horse cannot appear to any advantage unless he has a very long and well-turned neck."—*Farriers' Dictionary.*

THE spine affords us an example of a structure both supporting and supported: at its fore extremity the head is supported by it; at its hind, the tail; in the middle it supports the chest; while itself is supported by the fore and hind limbs. The head appended to the extremity of the vertebral chain is mechanically operating by its gravity the same as any dead weight placed at the end of a long lever; for which reason, though a long neck is *per se* objectionable, yet are there, as we have seen, some circumstances which may tend to mitigate, and others that will tend to nullify, these objec-

* Already described at page 10.

tions. A large head will, of course, render length in the neck less desirable; but even in this case much will depend upon the manner in which the head is "set on," and upon the mode in which it is carried, and something upon the form of the head itself. A sort of slang reply used by horse-dealers when any purchaser objects to a horse on account of the size of his head, is, "Oh, never mind his head, sir! he carries it himself." An apophthegm which, vulgar and absurd as it appears, like the motto in the old song, "means more than it says." For the dealer means his customer to understand that the animal is *capable*—possesses the power in his neck—of carrying his head without trouble to himself or inconvenience to his rider; and that, therefore, his big head is in point of fact not an objection to him, or at least only so far as regards its appearance.

Abstract size of the head is of less consequence than the carriage of it; and, in order that it may be well carried, the head must be properly "set on." Upon this depends the power of getting the head into the proper position. When the head is properly set on, and the neck of adequate length, the riding-master's task becomes comparatively facile and pleasant: for such a horse Nature has done what he by art in vain endeavours to accomplish for a horse of an opposite conformation. In making these observations I am fully aware how much for the better horses having faulty conformation in these respects may, by a judicious system of manege, be improved: I know that they may, and to a greater degree than people in general imagine; at the same time I shall not be contradicted when I affirm, that there are necks straight or ewed, with heads set on in that fashion, that will defy all the riding-masters in Christendom to get them into a proper position, and make such horses ride in any tolerable form.

There is a great variety in the size and shape of horses' heads, and the indications they afford are no less unerring than useful to us in determining breed, qualifications, &c. The head may be of that ordinary magnitude and suitable character that attracts no particular notice; or it may be disproportionately *large* or *small*, or out of proportion in some of its parts; or such as is accounted *handsome*, or *plain*, or *ugly*; or such as denotes *kind* or *breeding*, or any *particular breed*, or *nationality*.

A LARGE OR BIG HEAD is generally regarded as unsightly—

as detracting from the beauty of its possessor, or actually rendering him plain or ugly, and, consequently, as a sufficient reason to reject the purchase of such a horse. It does not follow that, because a head is large, it be plain or ugly, although we shall very often find these qualities combined: a coarse, vulgar, large head, with a countenance possessing neither breed nor sagacity, but rather expressive of ill-temperedness, is certainly enough to condemn the unfortunate owner of it, be his other qualifications what they may; but a head which, although large, shews shapeliness, and some breeding and sagacity, and withal has a good-tempered front, ought not to be despised on account of its magnitude. A frequent accompaniment of a large head is, what is called,

A ROMAN NOSE; and this, with many persons, constitutes an additional objection to it: for my own part, however, I do not carry dislike to this formation so far as is commonly done. I do not think, myself, that roman-nosed horses are in general ill-tempered, although low bred; nor have I found them inclined to vice: indeed, I can call to mind instances in which horses with such heads have turned out very good of their kind. It is, however, as being the very reverse in form of the blood or Arabian head, a decisive mark of low or rather no breeding, and therefore can only be tolerated in half or coarse-bred horses.

A SMALL HEAD is almost peculiar to the well-bred horse: we rarely see it unless in conjunction with breeding; and yet there may be a vulgarity about its make and expression which, were it not for its diminished size, we should consider rank and objectionable. It may have neither the forehead, nor the muzzle, nor the jowl, of the true blood head. In a racer such would be regarded as vulgar, and give rise to suspicions of pedigree; in a half-bred horse its smallness might, and probably would, tend to enhance his estimation; though, when the countenance did not warrant it, very likely most unjustifiably. Generally speaking, however, a small head turns out to be

A BLOOD HEAD—that which the nearest approaches *the Arabian*, and yet has now become so congenerous with, and characteristic of, our own breed of race-horses, that it may be said to be the peculiar attribute of the *thorough-bred* horse. Of all heads this is the one to be lauded and valued. There can be no doubt about *family* when this

makes its appearance. At the same time that it possesses breadth and fulness in parts where capacity is needed, it is so "lean" every where, that every subcutaneous vein and muscle may be distinguished through the skin. Ample across the forehead, wide between the ears, small and yet expanding at the muzzle, capacious in throat, and broad though elegantly curved at its junction with the neck, the head of the racer is at once perfect and beautiful, and full of expression, and fire, and sagacity. Blood and action, speed and bottom, are all the natural attributes of a horse having such a head; and though these brilliant qualities may be in a measure sullied by temper, still, in a general way, this is the head that is to be regarded as emblematic of all that is good and valuable in the horse species. For all this we stand indebted to the Arabian, the *radix* of our blood stock: although we have, it must be allowed, greatly improved upon the original breed, still for our present unequalled turf-horse are we as much in debt to the Arabian as the farmer or the horticulturist is for his improved vegetable productions to the exotic or graft from another country.

We have been considering the most eligible size and shape, or kind of head; but we have said nothing yet about what, perhaps, is of more consequence than either its magnitude or form, or what, more properly speaking, may in a measure comprehend both, viz. the *face* or expression of the head—the *countenance* of the horse, if I may be allowed the phrase. To persons not conversant with or observant of horses, it is quite incredible what an endless variety there is in this respect; almost as many shades of difference as exist in the human countenance. Take, for example, the Household Brigade of Cavalry, all blacks, and nearly a thousand strong, drawn up in line, and examine with philosophic eye the horses' faces: no two will be found alike; every individual will present his own peculiar expression; and by that look, always indicative of property or propensity of some sort, will he best be distinguished out of a herd of other horses of the same colour. The common mode of distinguishing horses is by colour and marks, and size and shape, and so forth; but this is not the true unerring characteristic: that is to be found in the face alone. In many animals there is an evident difference between the countenances of the male and female; a remark that holds good with horses so long as they continue un-

castrated, but not with geldings deprived of their testicles at the very early age they commonly are. I have on numerous occasions essayed to determine the sex of a horse- -gelding or mare—by examining the face when first confronted with the stable door; but I have found myself in error too often to think of drawing any distinct traits of difference between their countenances, and have been forced to confess I knew not whether I were looking at a mare or a gelding. Still, a great deal more information than appears to be imagined may be gleaned from a happy knack of catching the expressions of horses' faces—the science of *horse-physiognomy*.

I possess an esteemed acquaintance on the turf—a gentleman whose judgment in the choice of a racer, by everybody intimate with him, is on all occasions appealed to—who will not purchase a thorough-bred horse unless his countenance be such as he approves of. An ill-visaged, bad-tempered looking horse he invariably declines at any price. His common practice in selecting racers out of large studs is to have the horses for sale brought first to the door or window of the stable, to give him an opportunity of surveying their countenances; after which, he only sees out such as he has in physiognomy found faultless.

I remember one day, while in Ireland, accompanying my friend from Dublin into the country, in a buggy, to his chateau, when, as we were riding along, I perchance observed to him, what a pretty foal was running by the side of a thorough-bred mare in a field by the road-side. "Yes," replied he; "and that foal looks to me as if he were got by ———," a racing stallion then in England. "How can that be," said I, "when the horse is not in this country?" "Why," returned he, "the mare must have been imported in foal." "Oh, then I suppose you know that to have been the case." "No! indeed, I know nothing further than that the foal's face has the identical expression of the old horse's." "Then you really must excuse me, saying, that it appears to me you are forming an opinion of the sire of the foal upon very slender grounds." "*Slender* as you suppose them, I will make you a wager of a guinea they prove correct." "Done!"—The way to settle the dispute was ready enough: the farm-house of the property lay about half a mile out of the high road. Thither we drove; saw the proprietor, a stranger to both of us; and from him learnt, to my surprise and

loss of my wager, that the colt was got by the horse named, the mare having been purchased in England and brought over in foal.

This little anecdote will serve to remind us, as connoisseurs in horses, that we are not in the habit of paying all the attention we ought to the heads of horses, and in particular to that part of them we call the face. We are told, the *countenance* is "the peculiar property of man"—is the mind pourtrayed in the face: call it what we may, however, there is in every brute an expression of face peculiar to him or his kindred by which we may not only recognise him better than by any other distinctive character, but in a very great degree judge of his temper and capabilities The large head not infrequently possesses a face whose aspect is recommendatory, or of a character so open and good-tempered as to assure us of the tractability and willingness of its possessor; circumstances under which it would be wrong, unless it were in the case of a race-horse, to object to it. I have known a great many good big-headed half-bred horses—hunters, roadsters, &c.—with faces of kindly expression: at the same time I must join in the universal anathema pronounced upon big, *ugly* heads, and particularly when combined with sour, ill-tempered countenances.

The head includes within it three great cavities or compartments:—one occupying the summit, forehead, and temples, for holding the *brain;* a second, extending from the forehead to the muzzle, including the fore part of the face, for containing *the apparatus for smelling;* a third, known as the mouth, in which are fixed the instruments for *the mastication of the food:* in addition to which the head furnishes lodgment for *the organs of sight and hearing*—the eyes and the ears. The throat, likewise, is a part of very great importance: it includes the *larynx,* the entrance-door into the windpipe, and a fulness hereabouts, externally, is an indication that this aperture is of ample dimensions, and well-constructed for the purposes of respiration: in other words, a full throat or throttle is one of the signs of "good wind." In fact, as a general observation, we may assume, that the capabilities of parts are, *cæteris paribus,* commensurate with their development. The Arabian or blood head, affords a good illustration of this. Its noble broad forehead vouches for an ample share of sagacity; its promi-

nent nose and dilated nostrils, coupled with fulness about the throat and width across the jowl, shews that ample provision has been made for the olfactory, respiratory, and manducatory apparatus: so that, small as the blood head at first view appears, it, in point of fact, is large, or rather capacious, in every part where development of the contained organs is required. Thus, that which is set down as the handsomest of heads, turns out, on examination, to be the most serviceable of heads: in this, as, indeed, in most—in all—other instances in the animal economy, utility and beauty go hand in hand.

THE MUZZLE, as all the inferior or most dependent part of the head is called, including the nostrils and lips and mouth, is very characteristic of the breed or species. Observe what a difference exists between the muzzles of a low and a high-bred horse: the one, broad and flat and mean-looking, emerging from a line more or less convex down the front of the face, and curving down into the upper lip, with nostrils over-lapping, and their contracted entrances beset and almost closed by long hairs: the other, small enough, as the saying is, "to go into a pint-pot," with every part boldly marked, and its outline, instead of a curve, being straight along the front, or from about the middle of the face, inclining forward or outward even beyond the perpendicular of the line of the face, and, instead of declining, ending abruptly in a prominent point, from which it turns sharply down, at a right angle nearly, to form the upper lip; the nostrils at the sides standing open, with their scanty borders seemingly insufficient to cover them, and with hardly any hair at their entrances. It is difficult to sketch these differences in words: a drawing might serve to elucidate the description; but, to thoroughly understand all that is said, the living subjects themselves must be consulted. The muzzle is a part very characteristic of breeding; so much so that, when other points are dubiously developed, great reliance may be placed upon it alone.

THE EYES strike the most superficial observer as tokens of breed. Everybody has noticed the difference between the eye of an Arabian or English racer, and that of the half or cart-bred horse: the bold and decided brow, and full gazelle eye of the

former, cannot fail to attract attention. But there is a very great variety in eyes, and in the expression given by them; hence one reason for the interminable differences in the countenances of animals. I cannot say, myself, I admire an over-full or exceeding prominent eye; there is a sort of unnatural expression about it which I have often fancied has turned out to amount to—what grooms call—"foolishness," and I have, more than once, imagined such horses to be near-sighted. Opposed to this, we meet with the small, sunken, dark-looking eye, which creates a suspicion about temper, and particularly when an expression of what is called "sourness" is to be observed in it. I have seen several instances of viciousness in horses with such eyes, and therefore am I biassed against them; at the same time I have known horses with such sour, ill-tempered-looking eyes, after having been cured of their vice, turn out the very best of their kind. I remember well a dark chestnut horse my father purchased of Dyson, after he had been rejected by the Artillery as a trooper, at the price of £30: he had what are called *pig-eyes*, and a more restive, ill-tempered horse, perhaps, never existed. However, by dint of perseverance in long and daily rides by a bold and fearless horseman, his rebellious spirit was at length subdued, and ultimately he became quiet and tractable enough "for a child to ride;" turning out such a hunter as no fence could stop or the longest day tire; and being sold to Mr. J. Nicholl for £90, who afterwards refused two hundred guineas for him—any price that could be offered, in fact—in consequence of his turning out about the very best horse in the *Berkeley* hunt.

There is a notion abroad, that a horse who shews "the white of his eye" is inclined to be vicious; and, like most other notions of the sort, this appears to have had some truth for its foundation, though the truth has been somewhat distorted in the deductions. Some—very few—horses shew the white of their eyes naturally*; many do so by a habit of turning their eyes upon any person approaching them, and particularly in their stalls; which glance

* Animals in general shew only the transparent part of the eye: man and the hog disclose the white of the eye.

askaunt necessarily discloses more or less of the white of the eye. Now this oblique or retrospective cast of the eye may certainly be—and mostly is, perhaps—accompanied with some thought or intention of biting or kicking; but, on the other hand, it may be the effect of habit, of a playful disposition even, and so may not portend any evil. I have met with many cases of both descriptions, where vice was and where vice was not present; but I cannot add, I have encountered such a majority of the former description as to pronounce "shewing the white of the eye" an infallible indication of a vicious disposition.

Before I conclude this Lecture, let me recommend to the notice of my reader the study of *horse physiognomy:* it will, as a horseman or veterinarian, repay him for any time and attention he may bestow upon it; he will find in it the only infallible criterion whereby to recognise an old servant or acquaintance; to enable him to distinguish one horse from another; and, at the same time, will derive from it that sort of discriminative knowledge which will give him considerable insight into the propensities and qualities of horses, even before any opportunity has been afforded him of making trial of them. To the acquirement of such knowledge an extensive field for observation is essential, with opportunities of becoming acquainted with the tempers and characters of horses; and, even with these opportunities, it is only by a daily collection of facts, and by deductions cautiously and tardily drawn from them, that we can expect to arrive at any perfection in a science at the present day so undeservedly neglected.

LECTURE III.

THE BODY.

"In making choice of a horse you must take care that he has a good body, and is full in the flanks; for it is not one of the best signs when the last of the short ribs is at a considerable distance from the haunch bone, or when the ribs are too much straightened in their compass; as they ought to rise equal with the haunch bone, or nearly so." * * * "A narrow-chested horse can never have a good body, nor breathe well, and such horses as have straight ribs, and are at the same time great feeders, will soon distend their bellies to such a degree, that it will be impossible for their entrails to be contained within their ribs, so they will press down, and form what is commonly called 'a cow's belly.' These horses are difficult to be saddled, but have generally good backs; and though their croups are not so beautiful, being for the most part pointed, yet in recompence for that deficiency, they have generally excellent reins."—*Farrier's Dictionary.*

FOR convenience of description, the entire animal machine is divided into *body, neck, head,* and *limbs* or *extremities.*

THE BODY, in the skeleton, appears formed by the *spine,* the *ribs,* and the *breast-bone:* these together constitute an inclosure which anatomists call the *chest.* But in the living or undissected animal, we have superadded to this, another inclosure, known as the *belly;* which, from the circumstance of its walls being composed of *soft parts*—flesh and skin—leaves no trace of its existence in the skeleton. Let us consider, first,

THE CHEST.

Of this inclosure the spine forms the roof, the ribs its sides, and the breast-bone its floor or bottom: all which parts are more or less excavated or rendered concave in their shape internally, in order that its cavity may be as extensive in every direction as the nature of the fabric will allow. The smooth bodies of the vertebræ are the parts presented to the interior of the chest, from which proceed, on either side, the ribs, describing in their course downward so many elliptical arches abutting upon the breast-bone. The foremost arches are short and straightened; the middle, large and circular; the hindermost ones diminishing in length, and becoming straight again. Altogether, the chest presents in the skeleton

a conical figure: small and contracted in front; broad, deep, and capacious in the middle and posterior regions.

The connexion between the ribs and the bones of the spine is by means of small joints which admit of a limited hinge-like motion between them; but to the breast-bone the ribs are attached by distinct *cartilages*—long pieces of gristle, so formed as to appear like a continuation of the ribs themselves, and virtually, indeed, to answer in some respects a like purpose; for they complete the inclosure inferiorly, and to the contained parts offer, to the extent they reach, as effectual protection as the ribs would give. But they serve purposes bones could not answer. They enable the ribs to enjoy that motion, outwardly, which their joints with the vertebræ intended they should have, for the purposes of respiration; they also enable the ribs to accommodate themselves, by partial turns, twists, and inclinations, to the various movements of the animal: further, by their own elasticity, they endow the ribs with that power of yielding, that high degree of resiliency, which proves the means of their resisting fracture in hundreds of instances where, without the cartilages, fracture must have ensued. The blows, the pressure, the squeezes, the hard rubs, the ribs get, would over and over again break them to shatters were it not for their cartilages. How rarely do we hear of a horse getting his ribs broken, even from the heaviest falls, from the hardest blows, from the greatest weight imposed upon them!—when any shock of this description is given, we hear a sudden burst of air from the chest, occasioning momentary exhaustion; but we rarely indeed find it productive of fracture of the ribs. Far other and fatal must have been the consequences had the entire rib been one solid piece of bone: to say nothing about the difficulty any act of exertion must necessarily have occasioned in the breathing, any violent blow or fall, or great weight jolted upon the back, must have broken the ribs into pieces. On the other hand, had the ribs been composed from end to end of cartilage solely, the form of the arch could not have been sustained; neither could the effects of blows, or superimposed weight have been resisted; but, sooner or later, the arches must have become bent inwards, and so encroached upon the cavity of the chest as to have compressed the organs of respiration and circulation to that degree that could not but have

ended in suffocation and death of the animal. It was only the judicious and well-arranged combination of bone and gristle in the construction of the chest that could answer all the various ends an all-wise Providence had in view.

The chest being the repository for the organs of respiration and circulation—the *lungs* and *heart*—the grand point for the consideration of the horseman, in judging of a horse in respect to it, is, its form or its *capacity*, the one being inferred from the other. It is natural to suppose that the largest lungs and heart inhabit the largest chests, and, *cæteris paribus*, that horses possessing them must also enjoy advantage in wind, as well as such other advantages as are found to accrue from an ample respiration and circulation: upon this, in fact, principally depend his powers of exertion and endurance, as also his constitutional disposition to make and maintain condition. Now, capacity of chest will be derived from breadth, depth, and length of the cavity.

BREADTH OF CHEST is the result of circularity in the arches of the ribs: hence a broad and a circular chest amount to the same thing, or have only this difference, that, the breadth not being always in the part where it ought to be, may be present without or with only a part of the circularity. For example, a horse that has a circular chest will have thick or strong shoulders, and a broad back and breast; but in another, the ribs may curve well out from the spine, giving breadth of back and thick shoulders, but afterwards turn suddenly inward and proceed to the brisket with hardly any further curvature; the result of which is that such a formed chest is defective, not only in depth, but in width likewise, except just at the superior part. When the ribs proceed from the spine to the breast-bone with very little arch or curvature outwards, the animal becomes narrow-chested, or, as it is pertinently expressed, *flat-sided*. In a well-formed chest the arches the ribs form from one abutment to the other are pretty regularly elliptical, and at their inferior ends are lengthened out so as to give as much *depth* to the cavity as is compatible with the general fabric: the curvatures of the ribs are conspicuous behind the elbows, and the rider feels he has, when mounted, a good clutch between his legs. The broad or circular chest being that which affords the most internal space—most room for the operations of the contained organs, out of which

result, wind, and strength, and stamina—it has ever been throughout the animal world considered a point of the greatest desideration. We see it associated with good wind and bodily strength in numerous quadrupeds, in fowls, in man even: we have only to contrast the circular chest of the bull-dog with the narrow one of the greyhound; that of the goose with the turkey's; and one man in this respect with another; and we shall have striking evidence of a fact of which it would be easy to multiply examples *ad infinitum*. It is upon this same principle of conformation that farmers, and graziers, and cattle dealers, proceed in their selection and judgment of stock—not for purposes of wind and strength, so much as for their known constitutional powers to grow fat, their disposition to feed kindly, and to turn out such in the hands of the butcher as others, differently formed, with double and treble the quantity of food, would never become: indeed, form of chest has grown into a consideration of the first importance with the agriculturist, and by him has been turned to a most useful and profitable account. And to the horseman, is it no mean advantage for him to possess a horse with good stamina—strong wind and constitution—one that will do double the work of another, and do that work upon comparatively little or indifferent provender? But, in his case, joined with this consideration, is another, one of equal or more import still, and that is, *action*. Can the horse with the circular chest perform—make use of his limbs—as well as one with a chest differently formed? Can he go as free and as fast? We must answer, No! The breadth of his chest will be disadvantageous to the action of his fore limbs; and, therefore, we must be content to make a sacrifice in one respect that we may be gainers in another. Nature, however, even in this apparent dilemma, has made a provision, by giving

Depth to the Chest: a formation which greatly compensates for deficiency in breadth, while it enables the animal to use his fore limbs with all the freedom and effect required. Be sure to look for plenty of *depth in the chest:* it is a most important point, where we cannot have breadth or circularity, and where speed or action is demanded. Nowhere in nature is the design of this or that form of chest more strikingly and beautifully shewn than in the different breeds of horses. The cart-horse is admired

for his "fine round barrel," and his "broad, full, fleshy bosom:" the racer, for his "great depth of chest," without that breadth and consequent seposition of the shoulders, which would diminish his facility of progression. In both cases—as in the bull-dog and greyhound—there is ample girth of chest, and, therefore, space enough for the play of the lungs and heart, though the circular admeasurement is obtained in different ways; the one animal being seldom required to go out of a footpace, the other being intended to trot, to gallop, to race. Observe how awkwardly and clumsily the cart-horse gallops, or even trots; and with what agility the thoroughbred glides along in his canter or speed! Only exchange their chests, however, and mark what would happen! The result is sufficiently shewn in what we see in cart-horses with deep and narrow chests, and in circular-chested race-horses: the one is "all abroad" in his gallop, and cannot go "any pace at all;" the other has not the substance about his shoulders and neck a horse for heavy and laborious draught ought to possess.

Length of Chest, in general, is not a desirable point in a horse, because it is commonly combined with shortness of rib, and consequent deficiency in the vertical diameter of the cavity, or else with flat-sidedness and narrowness of the area: where, however, we find the ribs of their requisite length and proper span, and where the interval between the last rib and the hip-bone is but short—which by horse people is called being "ribbed home," or "well ribbed up"—then the length of chest is what all judges in horses will not fail to admire. The space between the last rib and the hip or haunch-bone forms the part denominated *the flank*. When this is lengthy, and the flank in consequence loose or tucked up, the horse is said to be loose or slack in his loins; though, in point of fact, it is the *flank* and not the loin, which is "loose" or "slack:" at the same time be it observed, it is the circumstance of the loin being commonly defective in such formations that has led to the phraseology. Depth, and length, and breadth of chest, with other structures in accordance, will insure enduring speed, with wind and bottom in its possessor. One of the most remarkable instances I ever saw of this perfection of chest was in the famous old mare, *Fleurs-de-Lis*, the property of George the Fourth: she had one of the deepest chests and finest shoulders, perhaps, ever seen; and

for her qualifications and performances I need hardly refer any sporting man of the present day to the Records of Racing.

Before quitting this part of my subject, I would say a word or two concerning what is well understood among horse-men by the phrase "girth" of a horse, i. e. what he measures round in that part of his body usually encircled by the girths. So deceptive is this measure apt to be, that even the best judges are not unfrequently a good deal out in their opinion about the dimensions of horses' chests: I have often myself been surprised to find one horse measuring more than another whom I had regarded as a much larger chested horse. It is, therefore, in all cases, where any doubt arises, a good plan to refer to the rollers or girths, which afford never-failing tests of the true circumferent admeasurement: we may always learn from the groom that such a horse buckles up two or three holes tighter in his roller than such another; or that the girths which fitted the former are altogether too short or too long for the present occupier of his stall.

THE BREAST, as the front part of the chest is called—"the bosom," as it is wrongly and absurdly named by some—is a point worth our attention. It should possess breadth and fulness; the breast-bone should be prominent, and the sides of it well filled in with plumpness; the action of the fore limbs, as we shall see by and by, a good deal depending upon the formation and substance of the breast. When the breast is wide, the fore legs will be far apart, as we see instanced in the cart-horse and bull-dog; and, in consequence of the arches of the ribs being circular and projecting, the elbows are very apt to be turned outwards: a position of limb—to say nothing about its seposition from its fellow—very unfavourable for progression. On the other hand, when the breast is narrow, the fore limbs are approximated—seem, to use a dealer's expression, "as though they both issued out of one hole." This conformation favours speed, but on several accounts is highly objectionable. When the breast is narrow, the chest is so likewise; the animal is flat-sided; and his fore legs are placed so near together that, in action, they are continually striking each other, occasioning sores or bumps upon the fetlocks, speedy-cut, and other annoyances; not to mention the weedy make and want of stamina such a horse will evince. Dealers in cart-horses are very particu-

lar in their search after stock "with good," i. e. full and ample, breasts; they well know the value of such a point, and the dependence to be placed upon it in indicating a good or bad worker. With nags and others we are not in the habit, I should say, of paying sufficient attention to it. Although we may not require—had rather not have—a *broad* chest, yet cannot the breast be too fleshy or prominent. A lean-breasted horse cannot fail of being weak in his fore limbs, if he be not in his hind too. When I speak of a prominent breast, however, I do not mean one that projects so much forward that the fore legs appear to recede from it underneath the body, making the animal what is called "stand over;" for this shews faulty position of the fore limbs, and a sort of unnatural lengthiness about the fore parts of the breast, which cannot but prove disadvantageous in progression. I shall revert to this point when I come to speak of the position of the fore limbs.

THE BELLY.

This being a part which has no existence in the skeleton, would hardly, with propriety, be considered by us in this place, were it not intimately associated in its formation with the chest, and so dependent upon it for its form and size, that we seem called upon to transgress the rule of procedure we had set ourselves at the beginning.

The chest and belly, in inseparable union, constitute the *body*. Exteriorly, we can with difficulty determine where one begins and the other ends; but when we come to dissect the body, we find that, interiorly, their cavities are altogether separate, being divided by a broad and complete partition of fleshy substance. The size or bulk of the belly, for the most part, is regulated by the dimensions and form of the chest; though, in many instances, one is large, while the other is comparatively small. In a horse that is "ribbed up," or "ribbed home," the belly receives so much more support from the posterior ribs than when the interval between the last rib and hip-bone is long, that, with the chest, it appears, under all circumstances, to preserve a sort of indivisible union and never-varying proportion. But such horses as are short-

chested, or long or loose loined, and as are, according to the text we have prefixed, "at the same time great feeders, will soon distend their bellies to such a degree that it will be impossible for their entrails to be contained within their ribs; so they will press down, and form what is called 'a cow's belly.'" Upon such a horse, in consequence of the large circumferent measure posteriorly, and the diminished size of the girth round the brisket, the saddle is frequently riding forwards and the girths becoming loose; the only stay to the saddle being a crouper, or girthing tight enough round the middle of the belly to form a sort of indentation in that part, neither of which expedients is very pleasant to the horse or his rider. Opposed to this kind of formation of body is that in which, from want of length, or rather convexity, in the middle ribs, the circumferent measure decreases all the way from the place of girthing to the flanks: the consequence of which is, that the horse is continually slipping his roller and running through his clothes. It is always a sign of good make when a horse "carries his saddle well;" it shews that his back is properly formed, and that he is not encumbered with "a cow's belly." It also looks well when the roller keeps its place, at least when the circumstance is not solely referrible to size or distention of belly.

A LIGHT-CARCASSED, or *heron-gutted horse*, is commonly weak in constitution and defective in physical powers, and altogether unfit for every purpose where strength and endurance, or hard work, is required. Any extra exertion will take him off his feed; and, in addition, he is very likely to evince a timid, nervous, or fidgetty temper. A horse of this description may answer for the park or promenade, and be, with a rider who is not disconcerted or annoyed by his temper, even a favourite, though for real service or work he is next to valueless. We should, however, take care to make a distinction between a light-carcassed horse whose chest is deep, and so far good, and one that has neither chest nor belly to boast of; but, "without middle piece," appears all legs. The former may be a good feeder, and, should he possess this property, will perhaps, in spite of his lightness of belly, turn out to possess some stamina; the latter never can be worth any thing. Indeed, when there is good depth of chest, as regards speed in galloping—for racing—this greyhound form of body appears advantageous, not only from

the circumstance of the animal having less burthen to carry, but because, with the length and looseness of loin with which it is commonly associated, it adds to the facility and extent of the stride, allowing of the fuller accomplishment of that projection of the hind legs which tells so much in galloping progression. On the other hand, a horse that is wanted not more for speed than endurance, for heavy and hard hunting, or for any purpose of strength or lasting, must not possess this receding carcass and looseness of loin: he must be well ribbed up, and short in his flanks, and let down in his belly; must, to use the dealer's well-known phrases, possess "a good bread-basket," and look "as if he always carried his dinner with him." A horse so made, indeed, can hardly ever appear tucked up: the muscles forming the flanks are too short to contract much, and the ribs are too near the hips to admit of much compression of the bowels. After a long and fatiguing day with hounds, a horse with loose flanks and loins will appear as though he were "cut in two," as the saying goes: whereas, a horse well ribbed up, will hardly, after the same, shew any signs of work. What is understood by the phrase "constitution," under which is comprehended the power of standing work and of "coming again," or performing a great deal in a given time, cannot exist in any horse devoid or defective of middle piece.

LECTURE IV.

THE LEGS.

"The legs of a horse should have a due proportion in their length and strength to the weight and size of the carcass."—*Farrier's Dictionary.*

A SORT of general division may be made of the component pieces of the animal machine into parts supported and parts supporting, or, as having reference to loco-motion, into parts moved and parts moving. The body or trunk, including the appendage of the head and neck, which we have already considered, constitutes one division, while the four limbs, which we are now about to discourse on, make up the other.

As far as steady and stable support be the object, it will readily be admitted that four legs are better than three, and that two by no means could be made to answer the purpose of four, or even three: a three-legged form stands not so firmly as one with four legs; and though one with two legs may be contrived so as to stand alone, yet the slightest force disturbs its centre of gravity, and it falls; so little power of balancing itself is it found to possess. The three-legged table or stool, from its being circular or triangular, will stand as firmly as though it had four supporters; but the square table or oblong form requires four legs, one at each corner or salient angle, or two at either side, to give it the full and firm support of which by the carpenter's art it proves to be susceptible. Six or eight legs would nothing augment the stability or safety of the form, and but little its strength: every projecting part has already its prop of support, and the intermediate parts, unless the form be one of extraordinary length, require none. Thus it is with the animal body. Its oblong formation demanded four supporters, two before and two behind: three would not have given it the stability and power of resistance it at present possesses; and again, to have added two legs more, would have nothing increased the security of the standing posture, and but little the powers of support, while loco-motion must by such an addition necessarily have become more or less complicated and impeded.

It is seldom that the horse, while at rest, employs all his legs in maintaining the standing posture: commonly, one of the hind limbs will be found flexed—in a state of relaxation and repose, propping up the body passively only—while the other three remain extended: in this position, changing the flexed hind-leg from time to time, a horse will not only take his rest, but will sleep; no vigil or attention of the will being required to keep him upon his legs. Some horses never lie down—never appear to require recumbent repose.

Another reason why Nature has given four legs to the quadruped, is, that he may be enabled in progression to steadily poise himself upon three of them, while the fourth is in motion off the ground. Not merely in the walk and trot, but even in the gallop, is the action of the legs, both in leaving and coming to the ground,

alternate; and though two or three, or even all four feet may be in the air at the same instant of time, they never leave the ground nor alight upon it again simultaneously: by such a mode of action the purposes of progression are excellently served on the one hand, while on the other, the machine experiences no such concussion as it would have done had there existed but three legs, or had two of them come to the ground simultaneously, as is the case sometimes in galloping and leaping.

One advantage more accruing from the gift of four over a less number of legs is, that, having two before and two behind, the quadruped is enabled to use either pair as weapons of defence: the horse can rear or kick against his enemy; indeed, the hind legs may be said to be the horse's especial armaments against his foes. Some animals use their fore-legs in the way we do our arms, having claws instead of hoofs, which serve them after the manner of fingers: this they could not do were they not provided with two hind-legs, upon which they have the power of sitting or supporting themselves while their fore-limbs are otherwise employed.

THE POSITION, as well as the number of the limbs of the quadruped, evinces excellent contrivance of design. Not only have the limbs to support the body, but they have to carry it from place to place, and at the same time to move themselves under their burthen with more or less velocity. In a three-legged stool, or in a four-legged form or table, the legs are placed at the circumferent parts or projecting angles, as far apart as possible from each other, the objects being to extend the base or standing, and at the same time avoid the risk of the legs coming at any time, from weight imposed too near the edge, within the centre of gravity, and thereby proving incapable of saving the stool or table from upsetting. In these cases stability and strength is all that is required; but in the instance of the vital machine, not only are strength and stability needed, but facility of motion likewise; and extension of the sphere of the base or standing, which would have better insured the one, would have added difficulties or impediments in the way of the other.

Nature has placed her props of support at the extreme points or salient angles of the animal machine, and longitudinally has

extended the sphere of the base, but laterally has narrowed the body, and approximated the limbs, in order that the superincumbent burthen might as little as possible incommode them in their motions forwards and backwards, during progression.

When speaking of the chest, I observed, that the wider that cavity was made, the farther the two fore limbs must necessarily be thrown apart. This cannot fail to have an effect both on the standing and on the progression of the animal. A broad-chested horse—a cart or dray horse—stands more securely than a narrow-chested horse: his base of standing is wider, his props of support being farther removed from the centre of gravity. But, when the machine comes to be moved, the limbs thus widely separated will not operate with the same effect as others more directly under the centre of gravity—will not carry their load with the same advantage, nor will they act so straight-forwardly or so harmoniously together. The racer and the cart-horse, the greyhound and the bull-dog, and, among bipeds, the turkey and the goose, as I before stated, strikingly illustrate this point of structure in their make and in the gait or action arising out of it: to mark this difference we have but to compare the straight stealing-onward step of the racer with the round and short step of the dray-horse; the steady smooth canter of the greyhound with the rolling gait of the bull-dog; the pointed parade-like walk of the pea-fowl or the turkey with the waddle of the duck or goose. Nay, I might adduce even the human body—the woman with her broad hips, the man with his straight or narrow ones—to shew what a difference in the gait results from the limbs being thrown apart at the axes of their motions.

Length of Limb is likewise to be considered. Short legs are in general preferred, because in themselves they indicate superior strength, and because, by nature, they are associated with depth of chest and carcass, and other signs of stamina and durability; but the long limb possesses advantages in stride and leverage, and therefore, where speed is required, becomes a desirable formation. The length of limb must very much depend on the purpose the animal is destined for: a long leg would be as ill adapted for a cart-horse, or a horse to carry weight, as a short one

would be for a racer. In speaking of the body, I observed that the animal must have length, as well as power, to become fleet: "to get over the ground" *length* becomes absolutely necessary in the propelling parts of the machine, and these are the loins and the limbs. To be sure, we do occasionally meet with horses with long limbs and short bodies—the Persian horses I have seen have been of this description; but such are rare and undesirable conformations; the limbs, as I observed in a former lecture, doing too much for the body, or rather, the latter restricting them in their action. People in general make objection to horses with undue length of limb: such a horse has "too much daylight underneath him to be good for any thing" is a common expression enough in these cases; and, *primâ facie*—and in nine cases, perhaps, out of ten—these people are correct in their disapprobation. But, every now and then comes a horse before us with all this apparent objectionable sub-corporeal "daylight," and yet with extraordinary power in his long limbs, with circularity in his chest though it be not deep, and with the known character of being "a good feeder after work;" and when such a horse does present himself, we may, should he possess breeding, regard him, notwithstanding his long legs and light body, as an animal of a rare and valuable description. His legs having but little to carry, are therefore likely to "wear well;" but what is of the greatest consequence as a hunter or racer, he is likely to prove a fleet horse, and withal a good-winded horse. I have known horses whom, looking at their "herring guts" and long legs, nobody would have purchased, and yet, from their being in possession of the qualities hereinbefore mentioned, that have turned out most valuable acquisitions. I mention these facts to shew that one ought not hastily to reject a horse with long limbs and their ordinary accompaniment, a light carcass.

The Fore-Legs.

The two fore-limbs—*extremities*, as they are often called by professional persons—differ essentially from the hind ones in their superstructures; though their lower members and their pedestals are similar one to another. There is no resemblance, for instance,

between the shoulders and the haunches, little between the arms and the thighs; but below the knees and hocks, all the four legs are constituted alike.

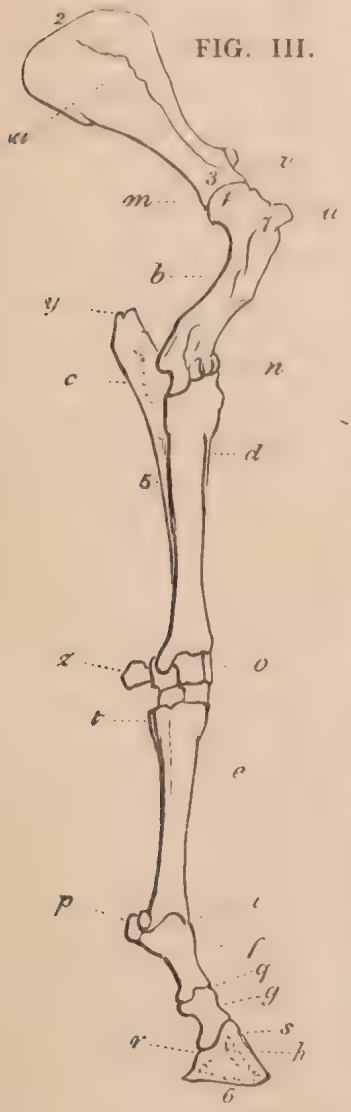


FIG. III.

The divisions of the fore-extremity are, the *shoulder* (*a*, *b*), the *arm* (*c*, *d*), the *cannon* (*e*), the *pastern (f)*, the *coronet* (*g*), and the *foot* (*h*): the joints are, the *shoulder-joint* (3, 4), the *elbow-joint* (*n*), the *knee* (*o*), the *fetlock* (*p*), the *pastern-joint* (*q*), the *navicular-joint* (*r*), and the *coffin-joint* (*s*). Each fore-limb is composed of twenty-one pieces or separate bones:—two compose the shoulder, the *scapula* or blade-bone (*a*) and the *humerus* (*b*); two, the arm, the *radius* (*d*) and the *ulna* (*c*); eight small bones (*o*, *z*), the knee; three, the leg, the *cannon* (*e*) and two *splint-bones* (*t*); two, the fetlock, the *sesamoid-bones* (*p*); one, the pastern, the *pastern-bone (f)*; one, the coronet, the *coronet-bone* (*g*); and two, the foot, the *coffin* (*h*) and the *navicular-bone* (*r*). Some of these bones are long, some short; some are cylindroid, some flattened in shape; some are obliquely, others perpendicularly placed: all are connected one to another in such manner as to form sorts of hinges or *joints* between them, from which they derive various kinds and degrees of motion.

Viewing the bones of the fore-limb in their natural position we find that, instead of its component pieces being ranged in perpendicular lines, one upon the other, some of them form angles with each other, while others descend in straight lines, direct from the body towards the ground. The two bones composing the shoulder, for instance, are angularly disposed; the arm and cannon bones constitute straight shafts of support; but the pasterns strike off in an oblique direction, at an obtuse angle, and

thus convey the superincumbent weight to the ground. This peculiarity in the direction given to the different bones we shall find has its uses. One grand object to be accomplished in the formation of the limbs was, to save them from the effects of the concussion which, in sustaining so great a weight as the body in action—occasionally surcharged too with a burthen in addition—must otherwise have fractured their component bones; nay, crushed such as are of a fragile texture into pieces. Another object, in the angular formation of the pasterns, has been, as we shall discover hereafter, to enable them, in a measure, to compensate for all absence of any thing like active foot-hold property in the hoofs of the horse.

The Shoulder.

No individual part of the animal frame, in the estimation of horse-people, calls for greater demands on their judgment than this: a good or a bad shoulder is held to be of paramount importance to the animal's riding or going in such a form as is pleasant to his rider, and as tells in action and safety as regards himself. The connoisseur steps up to the horse for sale, in his stall, and by simply carrying his eye over his shoulder and placing his hand upon his withers, determines at once his qualifications, either for saddle or harness, and whether he be such a nag as is likely to suit him for the purposes he requires. Before, however, I attempt to shew by-what art this "judge of horses" so summarily and surely arrives at this point of discernment, it will be necessary for us, first, to dissect the shoulder and examine its component parts; and, subsequently, to endeavour to analyze and understand its action in progression.

In the skeleton, the shoulder consists of two bones—the *scapula* and the *humerus*. The scapula or blade-bone—the same that we find in a shoulder of mutton—is the proper shoulder-bone; the only one in man and the monkey-tribe which constitutes the shoulder; the humerus being—as its name indicates—the *arm* bone: in the horse, however, and in other quadrupeds, both bones go to the formation of the part we call the shoulder. In an anatomical point of view, the fore-leg of the quadruped corresponds with

the *arm* of a man or a monkey, hence arise such differences in their structure as we might expect to find from knowing how vastly unlike they are in their economy: the arm of the quadruped, in fact, becomes a leg; the hand, a foot; and the offices of both altogether transposed. A man has it in his power to crawl or walk upon his hands and feet somewhat after the manner of a quadruped; a monkey does so by nature, at the same time that he possesses the power, to a certain degree, of erecting himself and walking upon two legs like a man, and using his fore limbs after the manner of arms: although, however, the monkey makes use of his upper or anterior extremities in this double capacity, neither in progression nor manipulation is he any thing like so perfect as quadrupeds on the one side and man on the other. It is the set-off of the humerus from the body—its connexion with the trunk by the head alone—which, with a somewhat different formation of joint between it and the scapula, enables the bone to perform all the various motions we see the arm of a man capable of: whereas, confined and bound to the sides of the ribs, as we behold it in the quadruped, it is simply susceptible of playing backwards and forwards, or, at least, of very little other kind of motion.

The scapula, being a broad flat bone, presents two large surfaces; an inner one, which is uniform and smooth, and a little excavated in order to adapt it the better to the convexities of the arches of the ribs, against which it is applied; and an outer one, having a longitudinal ridge (*Fig.* III, 2, 3) running upon it, unequally dividing it into two smaller surfaces. Between the scapula and the ribs there is no joint—neither osseous nor ligamentary connexion, but only a fleshy one: muscles alone attach the shoulders to the body; and as the body is supported anteriorly by the fore limbs, it follows that thus much of the weight is borne by muscular action, or, at least, by muscles becomes transmitted to the legs or pillars of support. A man by passing a knife between the scapula and the ribs would easily sever these fleshy attachments, and in this manner let fall the fore part of the trunk, and the head and neck along with it, to the ground. This constitutes the essential difference in their relations with the body between the fore and hind extremities: while the latter are connected to the trunk and support the hind parts of it through the medium of joints, the former hold

the body suspended, as it were, between them through the intervention of muscle.

The scapula is a bone of a triangular shape, having two long sides and one short: the latter, known as its *base*, is *in situ* turned upwards; its opponent angle, obtruncated and corresponding to the apex, being turned downwards. The position of the bone in relation to the body is oblique: its basis lies as far back as against the seventh rib, while its apex is protruding forward enough to be opposed to the first rib*: at least this appears to be the common situation of the bone, it being evident that any increase or decrease of obliquity must alter its relative apposition as regards the ribs. We see horses with oblique shoulders, and with straight or upright shoulders, and we shall find that the scapula varies in its degree of inclination very materially in these two cases; and that this variation constitutes one especial point on which depends the "goodness" or "badness" of the horse's shoulder. Before, however, we can comprehend the advantages and disadvantages of certain positions of the scapula, it will be necessary for us to examine, both in and out of its situation, the other component bone of the shoulder —the *humerus*.

This is one of that class of bones termed *cylindrical;* and cylindroid, though irregularly shaped, it is. It is surmounted by a spherical top, whose surface, the segment of a globe, is smooth and polished, evidently for the purpose of playing, after the manner of a spherical hinge, within a cup-like concavity occupying the place of the apex of the scapula. There are no two bones in the skeleton whose articular connexion is of a nature to admit more varied and extensive motion than exists between the scapula and the humerus. Let a man take a horse's fore-leg in his arms, and he will find that he can not merely bring it forward and carry it backward, but can also, to a considerable extent, make it perform a sort of rotatory motion: and this, the latter especially, he is enabled to effect in consequence of the mobility existing in the joint formed between the ball or head of the humerus and the socket in the lower end of the scapula.

The power of throwing the leg outwards or inwards in action, of turning the toe out or in, of performing those motions in the manege

* Turn back to "The Skeleton," page 7.

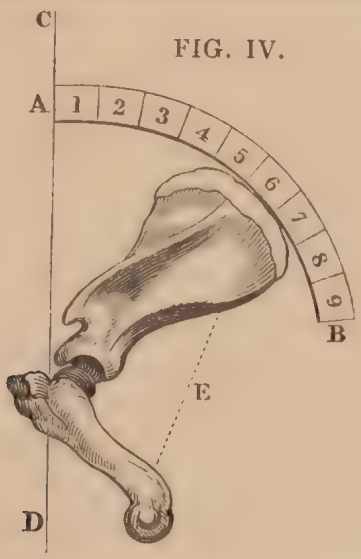
called *passaging* or *shouldering-in*, mostly resides in the rotatory motion possessed by this joint.

Viewing the relative positions of the bones of the fore-limb in the standing posture (*see Fig.* III), we perceive that the two composing the shoulder constitute, *in situ*, an angle of an obtuse character, having two sides; a superior, formed by the scapula; an inferior and shorter one, by the humerus: the point of the angle being turned forwards. This oblique or angular arrangement is attended with several manifest advantages. A larger extent of surface upon the side of the body is occupied and embraced by the bones so disposed, thus affording more extensive and firmer attachment of the limb to the trunk. At the same time that this angular apposition better ensures their connexion with the ribs, it likewise affords the bones facility of motion upon each other, without risk of disseveration or detachment from the sides of the chest; for the movements of the shoulders, which in action are considerable, have to be carried on, not only while the foot is off the ground, but at a time when all the weight of the body is imposed upon them. Another advantage of the angle is the extensive bordering and powerful leverage offered for the attachment and operation of muscle. Had the bones of the shoulder been placed upright or perpendicularly, one upon the other, in the first place, they could not have been made any thing like their present length; in the second, their connexion with the body would not have been equally secure; and, in the third place, their movements upon each other must have been comparatively restricted, giving rise to something in the form of action in the fore-limbs a great deal worse than that paddling sort of going which we denominate "pinned in the shoulders." This will appear more intelligible after we have shewn what is the nature of the motions or action of the shoulders.

The muscles attaching the scapulæ to the sides of the chest impart to the shoulders that strength which enables them to support the fore parts of the animal machine, and move under their burthen with a facility that no joint or other contrivance could have afforded them. The scapula or blade-bone, in the position we behold it while the horse is standing, possesses—in relation to an imaginary line let fall perpendicularly from the withers (see *Fig.* IV, C D)—a degree of inclination or obliquity which varies

more or less almost in every individual: one horse is said to have shoulders *oblique*, another to have them *straight*, depending on the more or less inclined position of the blade-bones; and the former is valued as a riding-horse, and justly so, while the other is condemned and rejected. The reason of this will appear evident when we come to learn that every time the shoulder is put in motion the scapula makes a sort of partial revolution on its own centre or axis, which at first slightly depresses, but instantly afterwards elevates and advances its base or upper part, while its lower part or obtruncated apex, which was at the commencement of the movement advanced, recedes until the scapula has nearly or quite revolved into a straight or upright position. The more oblique the original position of the scapula the greater will be its revolving sweep, and the more free and extensive the action of the shoulder, as will appear evident from the following diagram :—

FIG. IV.



Taking the graduated quadrant A B to represent the arc the scapula describes in its imperfect revolution, it is manifest that, setting the limit of its motion forward at the figure 1, its sphere of revolution will be increased in proportion as its inclination or obliquity is greater at the commencement: a scapula whose base inclines to number 7 in the scale will have two degrees of extent of action more than one which only reaches number 5, and two less than one whose base descends so low as the 9th degree.

The first movements of the shoulder-bones, those that lift the limb off the ground and advance it, consist in a limited revolution

of the scapula, in which its base turns backward and downward, its apex forward and upward, and in a simultaneous flexion and elevation of the humerus, the effect of which is to diminish the distance (represented in *Fig.* IV by the dotted line E) between it and the scapula. The projection of the limb in front of the body is effected by an extension of the humerus on the scapula, and, in rapid or forced movements, by an advance (not a revolution) of the scapula as well: but the instant the foot is grounded and becomes a fixed point and fulcrum, the scapula commences a counter-revolution, its base moving forward and upward, its apex backward and downward, and the humerus returns to its original semi-flexed position. Whether the limb moves upon the body, the foot being off the ground, or the body moves upon the limb, the foot being on the ground, in either case the scapula is in motion, its revolution, in regard to its summit, being backward and downward in one case, forward and upward in the other.

The length, as well as the obliquity, of the scapula will have an influence on the action of the shoulder, it being manifest that a body revolving upon its own centre must describe arcs or sweeps great in proportion to its length; hence the value of a deep shoulder: though, as regards the scapula itself, the muscles attached to and moving it will necessarily be short in a case where the bone is disproportionately long, and *vice versâ*. When the scapula is placed nearly upright, or is of disproportionate shortness, there cannot be that extent or freedom of action in the shoulders; neither can there be that projecture of the limb that there is in opposite conformations. The movements of the fore limbs are likely to be confined or imperfectly effected, and where those of the hind limbs happen to be "good," or of a more perfect kind—as is not infrequently the case—there will be great danger of the horse being, by the comparatively superior action in the agents of progression, precipitated forwards.

A good shoulder not only possesses depth and obliquity, but, to complete its perfection, "lie well into the body." How often do we discover upon the superficies of the shoulder a rising a little below and behind the withers, marking the situation of the summit or base of the scapula. In the generality of instances this arises from the ribs being arched in that part, which precludes the

possibility of the scapula being properly accommodated to them: a flattened body applied against one that is convex must necessarily project as the latter recedes from it; and the only way in which this can be obviated is, either to diminish or alter the convexity, or to give to the straight body a concave form; both of which accommodations are seen exemplified in what we call "good-shouldered horses." The rising is caused by the top of the scapula standing out from the convexity of the ribs: where this is not the case, the surface appears and feels uniformly level, and, where muscles or fat abound, is so smooth that we in vain seek the traces of the scapula through the skin. The uprightness and the length of the scapula likewise, in some instances, operate in producing the rising. In any case, the unevenness betrays mal-proportion or mal-apposition of parts: in other words, would not be present if all had been formed and fitted to perfection.

A shoulder, then, that possesses depth, obliquity, and uniformity, is said to be "good;" and for the purposes of those springy actions and paces which are most agreeable to and admired by the rider, good it most unquestionably is: it is good for action, good for speed, good for spring, and as a point of beauty is veritably indispensable. Still, though this be confessedly the prototype, we are not to set all other kinds and descriptions of shoulders down as faulty and objectionable. For the carriage of heavy burthen, and for heavy draught, I believe a straight or upright and rather short shoulder, provided it possesses the necessary substance or muscularity, to be advantageous: laborious draught does not admit either of a horse taking long steps or of going at any but a slow pace; and on abstract mechanical principles, a horse whose shoulder is short and upright is capable of supporting more weight upon his fore limbs than another in whom it is lengthy and oblique: the sharper the angle formed between the scapula and the humerus, and again between the humerus and radius, the weaker, as props of support, must the fore limbs be considered. A horse, therefore, with a short upright shoulder is, *cæteris paribus*, actually stronger in his fore parts than one possessing what we might call a good or handsome shoulder. Here, in fact, as in many other instances that might be mentioned, we have on the one side, *action*,—and with it spring—on the other, *strength*; and,

as I said before, for cart or dray horses, where heavy draught is required, or for animals wanted to carry heavy loads, the short and upright shoulder is to be preferred to the lengthy and oblique structure.

The connoisseur is quite correct in his observation—"Such a horse cannot ride, *short* and *straight*—for the two properties are commonly associated—as his shoulders are:" but let him not on this account reject the animal as useless: it is, as I said before, the sort of shoulder for harness, and for supporting weight, providing it possesses the required muscularity, and providing the horse has action with it: for, be it observed here, though action may be regarded as the natural product of an oblique shoulder, yet are there many instances where it is found to result from opposite conformations, as well as instances of its absence where one would from appearances prognosticate it to be present. This discrepancy between form and action it is that is so often baffling our judgment and furnishing us with physiological problems which, on too many occasions, we find ourselves unable to solve: nevertheless, the subject, intricate and difficult as it is, shall receive some attention when I come to speak of "action."

Let the action of the horse be what it may, however, should the shoulders be upright we may be certain of the loss of spring in his movements being such as to make him any thing but easy or accommodating in his paces to his rider: he is complained of as being "a rough trotter"—"a bone-setter;" and the higher his action happens to be, the greater will be the concussion. Mr. Youatt has compared the spring produced by the play of the scapula upon the humerus to the spring of a carriage; and in its operation it is a happy illustration of this piece of animal mechanism: the only difference being that in the coach-spring the elasticity resides in the steel of which the spring is manufactured; whereas the bones derive their spring from the elasticity of the material—ligament—by which they are connected together, and of that—muscle—by which they are united to the body.

We have been considering the *depth* of the shoulder and the *position* of the bones composing it, and in the course of our inquiries have noticed its *substance* or *muscularity:* we will now explain what we mean by

THICKNESS AND THINNESS OF SHOULDER, and investigate the relative advantages and disadvantages of these counter-formations. A notion very prevalent among horse-people is, that the shoulder cannot be too thin or "fine," as they call it; and that a thick or "loaded" shoulder is only fit for harness. In these remarks truth is mingled with error, and it shall be our business to endeavour to distinguish and separate them. To set about our investigation systematically, let us first inquire what constitutes this *thickness* or *thinness;*—to what kinds of conformation the terms are applicable, or what they are commonly used to denote. A person grasps the withers of a horse with his hand, and at once pronounces his shoulders "thick" or "thin:" *thin* or *fine*, should the withers stand high and can be included between his fingers and thumb; *thick*, should the withers appear buried between the shoulders, or be so broad across that the span of the hand can with difficulty grasp them: in the former case, we grasp nothing but the spinous processes of the dorsal vertebræ; in the latter, we appear to include the scapulæ as well; hence the thinness in one instance, the thickness in the other. There exists in such horses either inordinate length or shortness of spinous processes, inordinate length or shortness of scapula, or an unusual height or lowness of one or both of them, *in situ*, owing to their position. "The razor-back," as it is called, is the most remarkable instance of inordinately long spinous processes, and this is commonly combined with obliquity, and consequent lowness of the base of the scapula: altogether, presenting an example of "a *fine* shoulder;" though of one that often proves on examination to be strangely deficient in substance. These razor-backs and fine shoulders are frequently seen in very old horses: indeed, it is a common observation, that "shoulders grow fine with age;" the interpretation of which appears to be, that the shoulders participate in that general process of absorption which is known to pervade the animal frame during the decline of life. In young horses, at the growing time of life, the shoulders are thick by nature, and do not, until the adult period is completed, attain that degree of thinness or fineness which they in after-life are found to possess; coupled with which fact, and in corroboration of it, stands the observation so current among breeders and dealers, that their colts are certain to "rise" and "fine" in their

shoulders; and which is now, by all purchasers of young horses conversant in such matters, received as a general law of Nature, to which exceptions are comparatively rare. In my next lecture I hope to be able to shew, in a statistical manner, to what extent, and at what age, such growth may be expected to take place: in the mean time I would observe, in reference to it, that it appears to consist mainly or entirely in a shooting-up of the spinous processes of the vertebræ. We see the colt with thick clumsy shoulders in consequence of his scapulæ reaching as high as the tops of his spinous processes: we examine him grown to a horse, and find him with finely-formed shoulders—with scapulæ no higher than they ought to be, and with withers admirably raised; and, withal, we discover on admeasurement that he has actually risen one or two inches in the withers after, to a common observer, he might have been supposed to have attained his perfect growth.

LECTURE V.

THE SHOULDER (*continued*).

All "judges of horses" concur in the necessity, for the purposes of *riding*, for depth and obliquity of shoulder: if there be any discrepancy in opinion among such persons, it consists in one preferring a *strong*, another a *fine* shoulder. Even this, however, can hardly be said to amount to any division of judgment; for the thin shoulder will not, with "true judges," gain admiration unless it possess depth and strength; nor will the thick one be altogether approved unless it *rise* at the withers; in a word, we shall find what is considered by judges on both sides to constitute perfection of shoulder, to reside in a happy combination of depth and obliquity with strength and fineness; and if we desire any confirmation of this, we have only to make our observations on horses known to ride and go as horses ought to perform—on celebrated hunters, horses in Leicestershire and in all our capital studs, who in form are, nowadays, bred as near to perfection as, probably, it is possible for art to attain. I say "bred," because perfection of shoulder, like all animal formation, has manifestly been greatly promoted by attention to breeding.

In a racer—although there are race-horses enow in whom this formation exists and operates in its greatest beauty and perfection—the shoulder is not to be considered so much as the hind quarters and loins. Daily observation shews us, that the shoulder may be any thing but perfect in formation, and yet possess a good deal of action—that, as I said before, we are not advanced to that knowledge of shoulders which will enable us to pronounce on a horse's action by bare inspection of them: we cannot positively say his action will turn out very bad, or must prove very good; we pretend to know nothing *for certain* until the horse is put into action, and then, possibly, we may discover reasons why his action proves so much better or so much worse than we had anticipated. Many excellent racers have what we should call any thing but perfect shoulders; their good qualities are amply accounted for in their round fleshy loins and lengthy muscular hind quarters: on the contrary, many, I repeat, possess as handsome and well-formed shoulders as can be desired; and when this occurs along with the requisite strength and length in the hind parts, surely it must be regarded as a great advantage, providing the action be fitting and commensurate.

But for Harness, or even for support of burthen, as I observed in my last Lecture, the thick or heavy or loaded shoulder is to be preferred to the one that is thin, or that is oblique: a horse so formed is, *cæteris paribus*, actually stronger in his shoulders, capable of carrying and drawing heavier loads; in a word, better formed for these duties. It is not compatible with animal power to exert great strength in draught or carriage, and at the same time step out much in action: the short step husbands the strength, the long one expends it beyond the power of the animal to repeat the act many times or for any continuance with the same effect. It is no answer to this to say, we see horses with excellent action drawing very heavy carriages and still displaying their action in draught. Some horses, it is apparent enough, are in possession of such strength even in action that, what would ordinarily be considered, a heavy load does not oppress them: still, as a general rule, I have no fear in asserting, that both heavy carriage and heavy draught at first cramps or limits, and ultimately tends to habitually diminish action: the horse finds, with the enormous weight behind or upon him, that he cannot, as he could before, step out in action; he perceives, if he does, that he soon exhausts

his strength, cannot make way with his load, and therefore, compulsorily, shortens, and at the same time quickens, his step, not bending and rounding his legs in action as he did when out of harness, or when his draught or burthen proved but light. I well remember a little strong mare I used to drive in my four-wheel chaise, who stepped out remarkably well and even went with great freedom upon a level road; but who, the moment she came to any ascent or hill or bad piece of road, where she perceived the draught heavy, would shorten her step and go pottering along as though she had all at once fallen lame in her feet. In respect to the uprightness or straightness of what we may now call "harness shoulders," there seems to be some connexion between their formation and the common remark in the mouths of coachmen, "the collar cannot set too upright" in position: the straight shoulder affords good reason for such advice, for the scapula and collar will lie nearer in the same line, act therefore more harmoniously together, and the horse, in consequence, will be likely to work not only more agreeably to himself but with greater effect. If this be the proper view to take of draught, so far as the harness-collar and the scapula are concerned, the exposition may prove the means of throwing some light on the "setting" of the former: the remark of the coachman is founded on experience; he knows well that, in general, the collar cannot "set too upright," because—a circumstance perhaps he does not heed—his horses are in general of that description that have thick straight shoulders: when, however, the shoulders happen to be oppositely formed—such as are better adapted for riding than for drawing—we submit, the coachman's remark must fall to the ground, it being advisable, in such a case, that the set of the collar should be oblique—correspond, in fact, with the inclination of the scapula.

"A FINE SHOULDER" is a phrase among horse-people too often apt to be misapplied. Because a horse happens to have very great depth and obliquity in his shoulders, with high tapering withers, he is often said to possess fine or perfect shoulders, when, in reality, he probably lacks in them the very property of more consequence than any other we have been considering, and that is, *muscularity*. His shoulders are oblique and deep, and thin at the withers; but so bony are they, so deficient of flesh or muscle, that the blade-bone appears as if it had no covering save the skin,

through which its outlines are sufficiently apparent to render the horse a most desirable subject for any student of the anatomy of the bone to make observations upon. Muscle-less, and consequently weak as such shoulders are, horses having them often are endowed with brilliant action, and, for riding, turn out most agreeable; to carry or draw weight however, or as hunters—or even as racers, except for light weights and short distances—these horses never can turn out of any value: unless they happen to have—which is very seldom the case—extraordinary powers in their arms and hind quarters, and width in the chest. But when the reverse of this accompanies the thin or fleshless shoulder, however deep it may be, however oblique, however fine upon the withers, for all purposes where stability, strength, and endurance are required, it is absolutely inefficient.

In the department of this important subject—the shoulder—I will endeavour to redeem a promise I made at the conclusion of the last lecture, viz. to shew that horses, after they have to the common observer appeared to have completed their growth, do actually "rise" or grow in their withers, even, in some scarce instances, after the expiration of their seventh year.

So extremely variable and uncertain is found to be the growth of animals, that it is with a full sense of the fallibility of our predictions that we, at any period of their lives, offer opinions about the height they are likely to attain. I have heard a gentleman very conversant and observant in these matters say, it is best not, in purchasing horses, to make too sure of their growing after the third year of their age; and where colts at this age have the appearance of being proportioned, and, as the phrase goes, "set," this is a practical hint which I hold to be well worthy of remembrance: as a general observation, however, it by no means applies.* In our table, 17 three-year-olds out of 144 appear not to have grown in height, making a ratio of twelve per cent. Our faculty of forming tolerably correct opinions concerning future growth will mainly depend upon our opportunities of observation and the accuracy with which we may make deductions. Growing young horses, like growing boys and girls, are, as the phrase goes, "all legs and

* These remarks are meant to apply to *general appearances;* and not to have any reference to actual admeasurement.

wings." An old saying is in vogue, that the future tallness of the colt may be foretold by measuring the distance from the elbow to the fetlock, and carrying the same measurement upwards from the elbow upon the withers: both distances will be equal at the completion of growth; whatever, therefore, is, at the time of admeasurement, wanting in the upper line will have to be made up by growth, or, in other words, will constitute what the animal has yet to rise in the withers. A good deal of faith is put in this presumed attainment of certain proportions; and, for my own part, I can say I now attach sufficient credit to it to put the comparative measurement into experimental practice.* According to the table—compiled from the scanty, though not, I believe, faulty records I have at hand—there is not more than one horse out of eight or nine that does not continue his growth after the third or even the fourth year of his age; whereas, after the second year, the proportion diminishes to one in seventeen or eighteen; and, at the fifth year, increases to one in five or six. There are seven instances registered of horses growing after six years old; and one after the seventh year of age.

One instance stands recorded in the table of a two-year-old colt having made the extraordinary rise of $7\frac{1}{2}$ inches by the time he had completed his growth. He measured 15 hands $3\frac{1}{2}$ inches as a two-year-old, and at the adult period, seven or eight years of age, had attained the enormous height of 17 hands 3 inches. He was a long-legged, ill-proportioned animal, with high spirit and very good carriage of himself, and for this latter reason proved a pleasant horse to ride, though by no means a strong one. In regard to the quantum of growth likely to be made after the respective ages of 2, 3, and 4, on the average, one inch appears by the table to have been acquired after the second year, $\frac{1}{3}$d of an inch after the third year, and $\frac{1}{3}$d after the fourth year.

I submit these computations with considerable diffidence, on account of the limitedness of the records from which I have—in the absence of more—been forced to take them. In its present imperfect state the table may serve as some sort of guide for rough calculations, and to direct us in future inquiries.

* I am about entering on some experimental observations, through which I hope to throw some light on this interesting point.

A Table,

Shewing the relative Growths 255 Horses have made at 2, 3, 4, 5, 6, and 7 Years of Age.

Number of Horses 2 Years Old.	Increase of Growth.	Number of Horses 3 Years Old.	Increase of Growth.	Number of Horses 4 Years Old.	Increase of Growth.	Number of Horses 5 Years Old.	Increase of Growth.
	INCHES.		INCHES.		INCHES.		INCHES.
1	8½	1	5¾	2	3	2	2
1	5	2	4¼	1	2¾	1	1¾
1	4	1	4	4	2½	1	1¼
3	3¼	3	3¾	3	2¼	2	1
1	3	1	3½	2	2	3	½
1	2¾	5	3	1	1¾	2	None.
2	2½	4	2¾	5	1½	11	6½
3	2	5	2½	3	1¼		
2	1¾	3	2¼	8	1		
3	1½	7	2	3	¾	Number of Horses 6 Years Old.	Increase of Growth.
6	1	8	1¾	13	½		INCHES.
3	¾	10	1½	6	¼	1	2½
2	½	11	1¼	7	None.	3	1
4	¼	27	1	—	—	1	¾
2	None.	11	¾	—	—	2	½
—	—	17	½	—	—		
—	—	11	¼	—	—	7	4¾
—	—	17	None.	—	—		
—	—	—	—	—	—	Number of Horses 7 Years Old.	Increase of Growth.
—	—	—	—	—	—		
—	—	—	—	—	—		INCH.
35	36¾	144	40¾	48	19½	1	¾

We must not think of quitting this subject until we have profitted by the brilliant lights that have been incidentally cast upon it by one of the greatest physiologists and discoverers of the age in which we live,—the late Sir Charles Bell. Every one is acquainted with those interesting and beautiful productions, "The Bridgewater Treatises," among which, as one link in the series, stands the work from which we are about to make extracts that will confer pre-eminent richness upon our present field of investigation.

After observing that, in the horse and other quadrupeds, with few exceptions, the connexion between the extremity and the

trunk is solely through muscles; and that in the horse, as in most quadrupeds, the speed results from the strength of the loins and hinder extremities, Sir Charles continues, "Were the anterior extremities joined to the trunk firmly, and by bone, they could not withstand the shock from the descent of the whole weight thrown forwards; even though they were as powerful as the posterior extremities, they would suffer fracture or dislocation. We cannot but admire, therefore, the provision in all quadrupeds whose speed is great, and whose spring is extensive, that, from the relative position of their bones, they have an elastic resistance, by which the shock of descending is diminished."

"If we observe the bones of the anterior extremities of the horse, we shall see that the scapula is oblique to the chest; the humerus oblique to the scapula; and the bones of the fore-arm, (called by us the *arm*) at an angle with the humerus. Were these bones connected together in a straight line, end to end, the shock of alighting would be conveyed through a solid column, and the bones of the foot or the joints would suffer from the concussion. When the rider is thrown forwards on his hands, and more certainly when he is pitched on his shoulder, the collar-bone is broken, because, in man, the bone forms a link of connexion between the shoulder and the trunk, so as to receive the whole shock; and the same would happen in the horse, the stag, and all quadrupeds of great strength and swiftness, were not the scapula sustained by muscles, and not by bone, and did not the bones recoil and fold up."—"Much of the strength, if not the freedom and rapidity of motion, of a limb, will depend on the angle at which the bones lie to each other; for this mainly affects the insertion, and, consequently, the power of the muscles. We know, and every moment feel, that when the arm is extended we possess little power in bending it; but as we bend it the power is increased, which is owing to the change in the direction of the force acting upon the bone, or, in other words, because the tendon becomes more perpendicular to the lever."

We have already shewn that the scapula possesses a rotatory sort of motion upon the ribs, and that the sphere of its motion becomes increased by its degree of obliquity. Sir C. Bell has explained the cause of this—"the serratus muscle"—the fleshy at-

tachment of the scapula to the trunk, and the means through which the latter is suspended—"when the scapula is oblique, has more power in rolling it." Other muscular advantages likewise accrue. "When the scapula lies at right angles with the humerus, the muscles which are attached to the latter act with more effect. And on the same principle, by the oblique position of the humerus, and, consequently, its obliquity in reference to the radius and ulna, the power of the muscle inserted into the olecranon is increased. On the whole, both power and elasticity are gained by this position of the superior bones of the fore leg. It gives to the animal that springs a larger stretch in throwing himself forward, and security in a soft descent of its weight."

Sir Charles has admirably illustrated by sketches contrasting the fore extremity of the skeleton of the elephant with that of the camel, that the former is evidently constructed for strength, the latter for spring and speed: pillars of bones, like stone columns, standing in upright positions are evidently intended to support weight, movement being a secondary consideration; on the other hand, bones arranged in regard to each other in zigzag or oblique directions, are adapted for movement and spring, ability to carry weight being the secondary consideration. This point has been already illustrated by comparisons between the upright shoulders of dray-horses, and the oblique ones of thorough-breds.

Let us now pass to

THE ARM.

Anatomists and horsemen will find themselves at variance concerning the part to which this appellation is applied. The anatomist regards the *humerus* as the bone of the arm: the horseman calls that part "*the arm*" which extends from the elbow to the knee; and incongruous and, to the anatomist, confusing as these appellations, *arm* and *knee*, are, yet has custom so established their use among horse people that we dare not refuse to adopt them. The horseman's "arm", consequently, becomes the anatomist's "*fore-arm*": the *humerus* or proper arm being incorporated with the shoulder, from the circumstance of the horse not being provided, as a man, and a monkey, and some other beasts are, with those

little bones whose use is to set the arms off from the shoulders—the *clavicles* or collar-bones.

The arm of the horse, the same as our own fore-arm—to which, I repeat, it corresponds—has in its composition two bones, the *radius* and the *ulna;* but with this difference, that in man and the monkey, and also in some quadrupeds, the ulna is a separate bone of equal length with the radius; whereas in the horse it is nothing more than an attachment to the radius, the medium of union between them being in the young animal, and indeed up to the adult period, an elastic (cartilago-ligamentous) substance, which yields to force, and thus in action serves the purpose of a spring, diminishing concussion. Indeed, this appears to have been one reason why the ulna was not extended to the knee-joint: had it been a separate bone no such spring could have existed. At full growth, however, or very soon after, the uniting elastic matter becomes converted into bone, consolidating the ulna with the radius, and for ever destroying the original spring.

At the superior part the ulna enters into the composition of the elbow-joint, the same being the part which protuberates backward and forms the elbow. Thus placed and fashioned, the ulna answers two important uses: one is, extension of the surface of the joint and limit to its motion backward, by serving as a stop to it; the other is the leverage it offers for the insertion of muscles whose office is to extend the fore-limb. The advantages derived from long and prominent elbows are precisely such as are afforded by length of lever in any situation out of the body: providing the weight to be lifted and the lifting forces to remain the same, the power of the latter will be increased in direct ratio with the length of the lever—the elbow; and considering that the operation of these muscles though immediately upon the arm, extends all the way to the foot, a long lever may make a difference of some pounds even in the capabilities of the fore-limb. So far as progression is assisted by the fore extremities, it is by the action of the powerful muscles inserted into the elbows: while the flexors of the arm have only to lift the limb off the ground and advance it, the extensor muscles—attached to the elbow—have, the moment the foot is grounded, to aid in the grand operation of progression. We see, then, the necessity for long and prominent elbows. Some horses appear

as if they had no elbows: the protuberances are either so short or stand so in or upright, that they are not perceptible to the eye, and can hardly be felt; which I look upon, myself, as a great deficiency, though it is one that, even by "judges," is not at all times noticed. People invariably pay great attention to hocks, but seem to overlook elbows; as I said before, however, for my own part, I do think that length and form of elbow is a point of considerable importance, and as such, I never lose sight of it.

At mature age, the arm of the horse is composed of a single bone—the *radius*: the ulna being, in truth, but a process. And the radius is a bone of superior strength, its great length, with the weight and shocks, and muscular action it has to sustain, requiring that it should be so. Two smaller bones of the same length would have been too liable to fracture. Entering into the structure of the fore limb are two long straight shafts of support: the radius constitutes the uppermost of these, the cannon or leg bone the undermost; all the other supporters being angularly disposed.

The radius in itself, however, is not a mathematically straight bone: between one extremity and the other it is slightly curved, after the manner of a bow, the convexity of which is presented forwards; so that were it placed upon a table or any level surface, with its hinder part turned downward, it would form a very extended arc; and this shape it is which renders it remarkable beyond any other bone in the horse. Thus fashioned, as a column of support it is capable of sustaining greater weight, or at all events greater shocks, from a property, which as a sort of bow it must possess, of elasticity. What are called "calf-legs" do not arise from any deficiency of this bow of the radius, but from peculiar position of the knee-joints.

Superiorly, the radius is connected with the humerus, the nature of the joint formed between them being such as admits of flexion forwards and again of extension, but neither of flexion backwards nor of any lateral motion. A horse has the power of advancing his arm, and raising it rather beyond the line of right angle with his body; but he cannot bend it in a backward direction: the limb is extended backward through the motion of the humerus on the scapula. Had the elbow-joint moved backward as well as forward, the animal must have been so insecure upon his legs, that

constantly while in action, and even while standing still, he must have been in danger of falling, from his legs "slipping under him:" for the standing posture is only surely maintained by the continued action of the muscles implanted into the elbow.

Having considered the arm in relation to the connexion subsisting between the shoulder and it, to the leverage it offers by the projection of the elbow, and to its form and substance, let us now view it in reference to its length, and to the position it has in respect to the body, and afterwards proceed to the examination of the knee and leg.

A LONG ARM is held to be a point of excellence: it is one of the characteristics of speed; the deer, the greyhound, the fox, the rabbit and hare, have all of them long arms. It also denotes strength. A long arm includes the supposition of a short leg or cannon; and shortness in a bone which simply acts as a prop of support, is a sign of strength; hence the lower we descend in the limb, the shorter we find the bones: thus, the cannon is shorter than the arm; the pastern than the cannon; the coronet than the pastern; the objects being strength, and, as much as possible, the mitigation of concussion. The arm, it is true, likewise constitutes a shaft of support; but, then, it is on every side surrounded by muscle, from which it must receive considerable sustainment: whereas, the bones below the knee are without any active or vital embrace; are, in fact, left without any support and protection, save what little they derive from tendon and ligament. Again, the arm being the moving power, the leg, the part to be moved, length and substance in the former contrast advantageously with shortness and compactness in the latter: every inch added to the leg increases the weight of the shaft to be raised and projected, and calls for additional power in the propelling agent. And again, length of arm will give the horse advantage in action: every step he takes in a walk or trot, will, from the greater reach of the arm forwards, prove so much gained to him; and these gains, though insignificant of themselves, may in the course of a mile turn out something considerable.

Should the arm be short, though it be muscular and strong, yet will its power tell to comparatively less effect when the cannons are long, and from that circumstance alone proportionably weak: horses so made are absolutely weaker—less stable—upon their fore

legs than others: they do not possess the same power of recovering a false step, and are consequently more likely to fall and break their knees; neither do such legs "wear" well, but by hard work soon evince instability and tremor at the knee-joints, with knuckling-over of the fetlocks. On all accounts, therefore, a long arm with a short cannon is to be preferred.

THE POSITION OF THE FORE LIMBS, in respect to the trunk, in which I include their line of descent from the body to the ground, will mainly depend upon the length of the humerus, and the direction given to the radius by its articulation with it. In animals in which the humerus, forming part of the shoulder, is placed in an oblique position, it is, as is observed by Sir Chas. Bell, "necessarily short; otherwise it would throw the leg too far back, and make the head and neck project." "It is," continues Sir Charles, "one of the 'points' of a horse to have the humerus short. And not only have all animals of speed this character, but birds of long flight, as the swallow, have short humeri." In horses in whom the points of the shoulder appear to project inordinately forward, the fore limbs will be found to be placed farther backward than usual, owing to the too great length or obliquity of the humerus; and should the limbs at the same time, from the nature of their connexion with the humerus, have an inclination in their line of descent backward, such a horse, from his liability to fall and the little chance he has of recovering any stumble or mis-step, is to be regarded as dangerous in the extreme: in fact, he is fit but for harness, and never ought to carry a saddle. The centre of gravity being thrown so much more forward than it ought to be, with the undue preponderance given to the head and neck, will cause the weight of his body to be thrown, by the impetus of action, almost all into his harness-collar, and thus prove of material assistance to him in his draught. In a horse with well-formed and straight fore limbs, a plumb-line let fall from the point of the shoulder will drop touching the point of the toe; but in a horse formed after the manner described above, the line will fall in front of the toe of the hoof.

The Knee.

The knee of the quadruped is the part which corresponds, anatomically regarded, with the *carpus* or wrist of man: differently circumstanced, and differently used as the two parts are, yet is there considerable analogy between them in structure. Each of them is composed of eight bones, though in the knee only six out of the number are placed so as to sustain pressure; the remaining two being situated behind the others, out of the line of the superincumbent weight. One of these supplementary bones—called, from its shape, *trapezium*—is affixed edgeways to the outer part of the back of the knee-joint, and there answers the most important purpose of furnishing a lever for those muscles whose office it is to flex the leg: both celerity and force were required in this flexion or catching-up of the leg off the ground in action; and these are attained through the advantages the muscles derive in their action from the projection of the trapezium. When we see, therefore, great breadth of the outer side of the knee, and that its hinder part is very prominent, throwing the muscles attached to the point back and so increasing the breadth of the arm, we may pronounce such a horse to possess great power in flexing his legs, and commensurate strength and quickness in action.

There are six small bones, then, sorts of irregular or mis-shapen cubes, placed between the two main straight shafts of support of the fore limb, viz. the radius above, the cannon-bone below. Upon the summit of the latter the three lower of these bones, ranged in one row, rest; while upon the three constituting the upper row presses the lower end of the radius. Why was the knee-joint constituted in this manner? Why were these bones interposed? Why was not the end of the radius connected by joint at once with the end of the cannon-bone? Because Nature had more objects to fulfil than could have been accomplished by any simple or single formation of joint. By a joint between the radius and cannon-bone the weight would have been quite as well sustained as it is at present; but the concussion must have been greater: nay, the motion might have been as great even as it is now between these two bones; but then, at the time that the leg was flexed on the arm to the utmost, how would the knee-joint in front have become

exposed, and what must have been the consequences of a broken knee? or how could the animal with impunity have gone down upon his knees, in the act of lying down or kneeling, as he can at present? Suppose a sort of *patella* or knee-pan had been placed and attached in front of the knee, would that have answered the purpose? Perhaps, as far as standing and motion are concerned, it would; and, perhaps, some such contrivances as exist in the knee-joint of a man—the *semilunar cartilages*—might have been successfully introduced for warding off concussion: still, the chances both of fracture and dislocation must have been great, whereas now, such accidents never happen*; and besides, the knees so formed never could have undergone "the wear and tear" with the impunity they are, such as they are, enabled to do.

Nothing can exceed the complete aptitude of the joint of the knee for every purpose named and required of it. Though there are six bones actually entering into its composition, yet so braced and bound together are they, by ligaments, in their relative situations, that, while they admit of every requisite motion in the joint, they support the superincumbent weight with all the stability of a solid structure, and are secured both against fracture and dislocation under any use or abuse to which the knee may be subjected. Moreover, the joint receives protection both in front and back by the tendons which pass across it, and has, in addition, a general enclosure of capsular ligament.

Large knees constitute a good point in a horse; they denote strength and stability; in action, safety and endurance; and, as I observed before, it is a great point to have a boldly projecting trapezium. The motion of the knee-joint consists in flexion backwards —none whatever in the forward direction; and this flexion backwards is capable of being carried to the utmost extent—so far as to bring the back of the leg in contact with the back of the arm. Nothing illustrates this better than the strapping of the leg and arm together; an expedient not infrequently had recourse to when

* Many years ago, when I was quartered at Chatham, and in the habit of hunting with the Wouldham harriers, a person assured me he "put out his horse's knee-joint" in galloping hard down the declivity of Wouldham hill.

no assistant is at hand to take up the fore-leg, to make the horse stand firmly and immoveably upon the opposite one.

While in a state of flexion, some degree of lateral motion is possessed by the cannon; though the same no longer exists when the leg is extended. Lateral motion, in the extended position of the limb, could only have tended to diminish the stability and firmness of the standing posture, without possessing any countervailing advantage; but some degree of lateral mobility in the knee, in the flexed position of the limb—while the leg is in the air—enables the animal to round and collect his action, and direct his foot while *off* the ground and place it *upon* the ground, according as circumstances shall require of him. Some horses, we know, throw their feet outwards in going; some, inwards: foreign horses, especially, have the former kind of action; a good deal of which peculiarity in the flexion of the leg is effected through the lateral motion possessed by the knee-joint.

LECTURE VI.

THE FORE LEG OR CANNON.

As the knee of the horse is the part which anatomically corresponds to the wrist of man, so the fore leg, by the anatomist, is compared with that part of the human hand which extends from the wrist to the roots of the fingers; the *metacarpus*, as it is technically called. Hence the three bones composing the fore-leg in the horse are named, in accordance with the human metacarpus, the *metacarpal* bones. Carrying comparisons and names so far as this, however, appears, as Sir Charles Bell has aptly remarked, "losing the sense in the love of system." "There is no regular gradation," adds Sir Charles, in allusion to the many kinds of formation discoverable in the limbs, and other parts of animals, "but a variety most curiously adapting the same system of parts to every necessary purpose."

THE METACARPAL BONES, those that compose the leg, are three in number, viz. one *large* and two *small*. The large bone, one of the cylindrical class, and one that is particularly straight and round and smooth in its form, commonly goes by the name of *the cannon*

bone : an appellation given to it, I imagine, from some sort of resemblance it bears, it being perforated, to the barrel of a *cannon*, or else to a tube or pipe, which in Latin is *canna*, and from which our words *cannon* and *canon* are said to have been derived. The two small bones are very commonly called the *splent* or *splint bones ;* either because they are the seats of splents or splints, or from their own resemblance to splenters or splinters of wood, or of other hard *splitting* substance. The cannon bone constitutes the shaft of support of the leg : above it and upon it, with the interposition of the knee, stands the arm; while its lower end rests upon the pastern bone. The splint bones, pyramidal in shape, and adherent to the sides of the cannon, taper downward into points, or rather terminate in small tubercular knobs, which have no resting-places—no articulation with any bone beneath them; the consequence of which is, that the *whole* of the weight they receive in the support they give the body must have been directly transmitted to the cannon bone, had they not been cemented to its sides by a soft elastic substance, something of an intervening nature between cartilage and ligament, which admits of their yielding downward;—"descending," as Professor Coleman's expression used to be—every time pressure from above is imposed upon them. And as the superincumbent weight, in accordance with the laws of the centre of gravity, bears more upon the inner than upon the outer sides of the limbs, so the inner splint bone is furnished at the knee with an independent joint, i. e. one of the bones of the knee-joint rests *exclusively* upon the head of the inner bone; which is not the case with the bone on the outer side, that receiving but *a part* of the articulation of the bone of the knee above it*.

This yielding downward or descent of the splint bones on the imposition of weight, and of the inner more than of the outer bone, and the instantaneous recoil of them, or ascent, the moment the active pressure has ceased, has long, by veterinarians, been regarded as one of many contrivances, operating, after the manner of a spring in the limb, to save the animal machine from receiving

* A reference to these parts in the skeleton will demonstrate what I have said.

that concussion which otherwise must necessarily result from its great action and speed: some of the weight or pressure which, otherwise, must all have been received in a direct line by the cannon bone, and from it have descended to the pastern, is now diverted for the purpose of setting these springs in operation, and thereby conferring elasticity and ease on the animal's movements.

Such has been the use ascribed by veterinary physiologists to these bones, and no question that I know of has been raised about its propriety, before Sir Charles Bell took it into consideration, and expressed his dissent from it. "I have some hesitation," says Sir Charles, in his Treatise on 'The Hand,' "in admitting the correctness of the opinion of veterinary surgeons on this curious piece of mechanism. They imagine that these moveable splint bones, by playing up and down, as the foot is alternately raised and pressed to the ground, bestow elasticity, and prevent concussion. The fact certainly is, that by over-action this part becomes inflamed, and the extremities preternaturally joined by bone to the greater metacarpal or cannon bone; and that this, which is called a splint, is a cause of lameness."

"I suspect, rather," continues Sir Charles, "that, in a perfect state of the joint, these lesser metacarpal bones *act as a spring to throw out the foot when it is raised, and the knee bent.* If we admit that it is the quickness in the extension of this joint on which the rate of motion must principally depend, it will not escape observation, that, in the bent position of the knee, the extensor tendons have very little power, from their running so near to the centre of motion of the joint; and that, in fact, they require some additional means to aid the extension of the leg."

"Supposing that the head of the lesser metacarpal bone," says Sir Charles, in explanation of the above, "enters into the composition of the joint, it does not appear that, by its yielding when the foot is upon the ground, the bones of the carpus can descend, as long as they are sustained by the greater metacarpal or cannon bone; I do not, therefore, conceive that this bone can add to the elasticity of the foot. But when we perceive that the head of the splint bone is behind the centre of motion in the joint, it is obvious that it must be more pressed upon in the bent position of the joint

when the foot is elevated, *and that then the bone must descend.* If the splint bone be depressed when the limb is raised and bent, and have a power of recoiling (which it certainly has), *it must aid in throwing the leg into the straight position, and assist the extensor muscles of the knee* Further, we can readily believe that, when the elasticity of these splint bones is lost, by ossification uniting them firmly to the cannon bone, the want of such a piece of mechanism essential to the quick extension of the foot will make the horse apt to come down."

Supposing the horse's foot to be placed upon a perfectly level unyielding surface, and the weight from above to be thrown upon the limb in a direct line with the centre of motion, "it does not appear," as Sir Charles has observed, "the bones of the carpus can descend." But, supposing the animal's foot to be placed upon an uneven surface, or upon one that becomes so by yielding, may there not be such tilting of the carpal bones from the one-sided disposition of the weight expected to take place as will press downward the splint bone of one side, and so bring both bones into operation alternately or incidentally, as the case may be, depending upon the side to which the weight is inclined, which, commonly, is the inner one? According to this view, their operation is, of course, single, and independent of each other: according to former accounts, it was combined and simultaneous.

It is more than we dare assert, that the splint bone, from any pressure it receives in the bent condition of the joint, does not yield even to the extent of its elasticity, or to use the common phrase, though, as we think, an over-doing one, "descend;" but we certainly must pause ere we can believe such a trifling movement as this so-called *descent*, after all, can amount to, can have any effect in aiding "in throwing out the leg into the straight position, and assisting the extensor muscles of the knee:" too insignificant a cause, we conceive, to produce an effect so perceptible and so powerful.

Be the operation and use of these elastic powers what it may, few horses retain them after the adult period: the ligamentous elastic material becomes converted into osseous inelastic substance, and thus the three bones, in point of fact, consolidated into one. Do we discover any difference or alteration in horses' action on

this account? Is there any person can say, after he has mounted and ridden a horse, whether that horse have ossified splint bones or elastic ones? I have ridden numbers of horses in my time; and, as a general rule, certainly find that young horses possess more elasticity in their movements than old horses; and this is readily enough accounted for when we come to consider the number of animal springs there are in the body, all or most of which become impaired, and some altogether lost, in the course of age and work: among them, however, I should say those of the splint bones were probably the smallest in importance, and therefore would be the least of all missed.

In every horse that has splints this conversion of elastic into osseous union has necessarily taken place; and, as I said before, this is also found to be the case in every horse of a certain age, whether he shew splints or not: for the appearance of the splints is simply owing to *increased* or supplementary deposit of osseous matter, and is not the effect of mere ossification of the elastic substance. And this shews, when lameness arises from splint—which it occasionally, by no means always, does—that it is not attributable to the mere circumstance of the conversion of the uniting substance of the metacarpal bones from elastic into osseous matter, but is ascribable to the tumour, and we believe is caused by the straining or overstretching of the *periosteum*, the membrane which covers the bone. Were horses who had lost these springs to go lame, or even perceptibly roughly or jarringly, the preservation of them, and the ascertainment whether horses really possessed them or not, would become considerations of importance to us: since, however, we are, in truth, unable to say, from a horse's action, either on or off his back, whether these springs be in existence or not, we give ourselves, in practice, no concern whatever about them.

Short straight cannons are most desirable: as I have said in another place, length of arm and shortness of leg are *good points*—are signs of strength and action and endurance. While the distance from the elbow to the knee can hardly be too lengthy, that from the knee to the fetlock can hardly be too short: and the cannon bone should be straight in its position; neither inclining forwards, as in the calf-leg; nor directed backwards, as when the

fore limb, either from the length or position of the humerus, is running backward in that manner which gives the effect of what is called "standing over." The leg in form in the living horse should be flat and broad, not what is called "round:" the sinew should stand out far behind the bone, and feel tense, and distinct, and hard; and the interspace between the sinew and bone should give to the fingers the sensation of *a hollow*, a totally unoccupied interval, and not one filled up with soft substance, called, in horseman's phraseology, "gum." The cannon bone itself cannot be too large, providing there be breeding in the horse; and the only way to "judge of legs" is to *feel* them: by grasping them we ascertain their size; and by feeling them with our fingers we discover most surely what the proportion of sinew and bone is, compared with the weight to be carried. It is a frequent complaint, that horses are "small below the knee," meaning thereby that they are deficient in bone. In making this assertion, however, we should be careful not to be deceived by appearances; for the fore limbs will, now and then, have the appearance of wanting bone and sinew, when such is really not the case: in fine, the sole sure mode of "judging of legs" is to *feel* them—"run the hand down them," and span them; by which test one man can estimate a leg better in the dark than another, by simply looking at it, can in the light. It is very common to hear a gentleman say, "that horse is light below the knee;" to which the dealer, who *knows* his legs to be good, naively replies, "I think, sir, if you will *feel* them, you will not find any deficiency there!"

THE FETLOCK.

From the cannon we descend to the pastern, the two parts being connected by the joint known by the name of the *fetlock* or feetlock; so called from the lock or tuft of hair which grows from it.

The cannon, pastern, and coffin bones of the solidungulous animal bear evidence, in their formation, of that incorporation or consolidation of parts which we observe to take place in the scale of analogous structures, at the top of which stands the most perfect of digital formations, the human hand, at the bottom, immediately

below the cloven foot, the solipede or solid hoof; each losing something which renders it less useful as a hand, but gaining something which better adapts it for a foot, until all regard to the former is lost, and the latter remains paramount and exclusive. The cloven foot of the ruminant still maintains some clutch or hold upon the ground, but the undivided hoof of the horse is deprived of all this: that, *in its shod condition*, cannot be said to take any further hold upon the earth than what is mechanically derived from the pressure caused by the superincumbent force or weight, from the unevenness of the surface of the foot, from impress of it upon yielding ground. In the same manner that the cannon bone of the horse can be demonstrated to consist of an union of two metacarpal bones, so the pastern bones may be said, each of them, to be constituted of two united phalanges, and the coffin of a junction of the two separate or semi-coffin bones of the cloven foot.

The lower end of the cannon-bone has two roller-like, smooth, and polished surfaces, which play within correspondent concavities upon the summit of the pastern bone: the position of the latter, however, being obliquely forward, while the former stands in a perpendicular line, a large vacuity would necessarily be left behind, were not the sesamoid bones placed there for the purpose of completing the joint. These two little supplementary bones are kept in their places by ligaments, two running crosswise, attaching them to the pastern bone; but their mainstay, that which principally upholds them, and admits of the play or motion of them during the action of the fetlock joint, is the *suspensory ligament*. The sesamoid bones are so bound to the supero-posterior part of the pastern, that the three together form a cylindroid dish-like hollow, into which is received the lower end of the cannon-bone; and the weight from the latter preponderates upon one or other of the former, depending upon the obliquity or line of direction the pastern takes on leaving the cannon in its course to the foot. When the pastern deviates but little from the perpendicular of the limb, it is said to be "straight," and is almost always made "short;" so that short and straight pasterns are consentaneous formations: the reverse, short and slanting pasterns, being incompatibles, or at least such a combination as is rarely seen, and is attended with disadvantages both of strength and action. When, on the other hand, the pas-

tern forms, in leaving the cannon, a considerable angle, it is said to be "oblique," and is almost always extended in length, so as to assume the denomination of "long" or "lengthy:" this is a disposition of parts which also has its peculiar advantages, and one that would have its objects defeated or much abridged by any disproportionate shortening with the obliquity.

In proportion as the pastern is upright in position, less weight is imposed upon the sesamoid bones, more upon the pastern bone, and *vice versâ*. What pressure or weight the pastern-bone receives descends to the coronet, and thence to the coffin-bone. But what becomes of the weight imposed upon the sesamoids, they having no bones below to transmit it to? They are in a somewhat similar situation to the splint-bones; they call upon their attaching bands—their *ligaments*—to support them under the load; and their ligaments do so by yielding—they being elastic—so long as force is operating; and the instant it is not, they, through elasticity, again recover their short lengths, and so raise the sesamoid bones into their places. This descent and ascent of the sesamoids is not to be compared with that imperceptible and disputed motion of the splint-bones; on the contrary, it is a demonstrable and beautiful descending and ascending operation—a playing down and up, after the manner of a spring of most elastic and exquisite workmanship; imparting, at every step the horse takes, its anti-concussion influence to every part of his frame. Watch the long and elastic fetlocks of the Arabian or race-horse, as he is cantering upon turf, and at every bound he makes will the tufts of hair from those joints be seen dipping upon the ground; though, while the animal is standing still, they may be some inches even removed from the surface. Nothing can evince more beautifully and plainly than this the movements of the fetlock-joints.

The elastic band or ligament upon which the sesamoids repose in their descent, and depend for their re-ascent, is the *suspensory*. And, in order to shew what proportion of the superincumbent weight these bones sustain, or, rather, how insufficient the pastern is without their aid to support the burthen, we have only to cut the suspensory ligament through: that done, the horse is, in real truth, "broke down;" the feet slip forward, and the toes turn

up, while the fetlocks bend down upon the ground. Not so after division of the flexor tendons: we occasionally sever them by way of remedy for "knuckling over," and all that results is, the enabling or necessitating the animal to set his heel upon the ground: once divide the suspensory ligament, however, and no power left is able to maintain the pasterns erect. The suspensory ligament is, therefore, one of the mainsprings of the machine in action—one of the chief of those beautiful contrivances, which, while they save the leg-bones from being shivered to pieces under the force and shocks they have to sustain at every bound and leap the animal makes, insures himself and his rider ease and safety to their journey's end.

I have instanced the Arabian and the racer as most strikingly shewing the operation of the spring of the fetlock-joint, the limbs of horses of high breeding being characteristically remarkable both for the length and for the obliquity of their pasterns: other horses will evince this springiness in proportion as their pasterns possess the necessary length and obliquity, and such as have short and upright pasterns—cart and dray-horses—will possess it in the least degree. Why should this be? Was not elasticity and defence against concussion required in the cart-horse? Yes! to a certain degree; but not in like degree with the property of strength: he is an animal designed for feats of strength, his movements under such performances being tardy and measured; altogether unlike the race-horse, whose movements are required to be airy, and fleet, and bounding, with loads of the lightest description upon his back.

The late Professor Coleman—in his work on "The Foot of the Horse"—has thrown excellent light upon this part of our subject: "While the animal is at rest," says he, "and also during motion, these (sesamoid) bones sustain part of the weight; and where the pastern-joints are long and oblique, the sesamoid bones often receive so much of the weight as to put the ligaments violently on the stretch, and occasion lameness. This effect also may ensue in consequence of the heels of the hoof being improperly cut down, or the toe allowed to grow too long, or the heels being first raised by a high-heeled shoe, and that suddenly changed for a shoe with thin heels. All these causes, however, whether separate or combined, do not operate with so much violence in the hind as in the fore legs.

The additional weight of the head and neck to be sustained by the fore legs, renders all their springs more liable to injury and decay than the corresponding parts behind."

Although the fore limbs actually support more weight than the hind, and receive shocks of concussion unknown to the latter, and on these accounts become the ordinary seats of lameness, and are often seen worn out while the hind legs continue serviceable, yet, we must not pass by unnoticed that which, in this instance, would seem to have escaped the observation of the Professor, viz. the great deal the hind legs have to do as the agents of progression, and the consequent frequency of failure in the hind fetlock-joints. We know that many of our first hunters and racers become incapacitated from what is called "breaking down behind;" and we have no reason to feel surprise at this, when we consider the work these joints have to perform in progression: next to the hock, indeed, there is no part of the hind limb so forced and strained as the fetlock. One of the best race-horses this country ever produced—the Colonel—failed from this cause; and no effort on the part of Mr. Goodwin could set him up again upon the turf. Harness horses, employed in laborious draught, are very apt to fail in their hind fetlocks, these being the joints upon which so much stress is made in strenuous efforts in drawing up hill or along heavy roads. The greater the exertion the fetlock-joint is put to, the greater the flexion of it, and consequent stress or strain upon the sesamoids and their tendinous and ligamentary supports, producing either overstretch of them, or laceration of some of their component fibres at the moment, and thus occasioning immediate lameness; or else, by a repetition of effort, in time impairing or destroying their elastic properties, and thus inducing that relaxation and puffiness of the joint which we constantly observe in horses who have been, in the manner described, for years subjected to hard work.

Two circumstances, then, influence the quantum of stress or weight imposed upon the sesamoids,—the degree of flexion of the fetlock-joint, and the position, straight or oblique, of the pastern; and both these circumstances are, in a measure, under our control. We cannot, it is true, lengthen or shorten the pastern; but it is in our power, by means of shoeing, to alter the position of it: "The heels of the hoof being improperly cut down, or the toe allowed to

grow too long, or the heels being first raised by a high-heeled shoe, and that suddenly changed for a shoe with thin heels," are all causes which, says Professor Coleman, put the sesamoids on the stretch, and, on occasions, do so, no doubt, to the injury of their ligamentary connexions. There is not, however, so much harm done in this way as people in general imagine. Certainly, art cannot more insult nature than by suddenly and unpreparedly altering the habitual condition of any part of the body; and were a person to set about to produce lameness, perhaps he could hardly resort to a more effectual expedient than that of momentarily changing the relative position of the parts composing the fetlock and pastern joints, either from an upright to an oblique, or from an oblique to a straight position; indeed, were the surface upon which the horse treads like that of the table upon which we are writing, level and unyielding, injury might be certain to result. But, as matters stand, in the first place, there is almost always more or less yielding of the ground under the horse's feet to counteract the effects of this unnatural bearing of parts, and, in the second, there is inherent in the parts themselves *a power of adjustment*, sufficient, we believe, on all ordinary occasions, to ward off injury to them until such time as they shall be able to accommodate themselves to their new situations, or even, for a time, while the horse is going upon what may be compared to the table, viz. wood-pavement. We do not deny the mischief that *may* accrue from injudicious heightening or lowering of the heels of the foot by shoeing; we only have less apprehension of the consequences, on account of the yielding nature of the ground and the adjusting power of the parts themselves, than appear to be entertained by horse people in general.

LECTURE VII.

THE HIND LEGS.

"—Whereas, the narrow pin buttock, the hog rump, and the falling buttock, are all natural deformities, and in general render the creatures to which they belong unfit for either pad or pillion."—*Farrier's Dictionary.*

THE three bones below the pastern, properly speaking, belong to the *foot;* a part I shall defer the consideration of until we have completed the present series of lectures "on Form and Action:" in accordance with this plan I now proceed to the hind extremities.

In my description of the fore limbs, I observed that they differed materially from the hind ones in their superstructural divisions, notwithstanding that below the knees and hocks there existed, both in the living and dissected subjects, every identity between their structures: the osseous fabric of the fore limb exhibits, as a whole, a tolerably fair representation of the limb of the living animal; but than the haunches of the living horse and the parts representative thereof in the skeleton nothing can be more unlike. The framework of bones composing the hind quarters* exhibits a bold, rugged, zigzag structure, remarkable only for its irregularities, having here a huge projection, there a large void, with such a disposition of the component pieces as to offer every advantage, consistent with the general conformation, to the muscles that once filled the vacuities, and had their attachments to projections so strangely, yet wisely, shapen and disposed. The hind limbs are the agents of progression: though the fore contribute to the operation, they are no more than auxiliary forces, not absolutely requisite, and only on occasions called into action. This accounts for the especial development of the hind quarters in quadrupeds of speed, or such as are gifted with extraordinary powers of saltation, such as kangaroos. In surveying the points of a race-horse, the practical man on the turf sets great value on

* "Hind quarters," and "quarters" are expressions used here and in other places in the sense of *buttocks.*

one that is big-haunched; knowing well, that, *cæteris paribus*, a horse so made cannot be far behind his competitors in the race.

THE PELVIS is the name given to that irregular quadrangle of bone which, completing the skeleton posteriorly, constitutes the framework or basis of the rump and hips*. It is formed by the counter-position and part union of the two hip or haunch bones, and by the sacrum or rump-bone, which is let in between them, and makes a sort of roofing to the cavity of the pelvis. In an anatomical point of view, the pelvis is a part of considerable importance, from the circumstance of its lodging within its cavity the urinary bladder, and the organs of generation in the female: to us, on the present occasion, it is of importance chiefly on account of its position in regard to obliquity, its shape, and its magnitude, and the consequent facility it affords the femoral bones in their motions, and the leverage it offers to the muscles attached to it. A small or narrow pelvis cramps the viscera within it, leaves insufficient space for the *fœtus in utero*, and produces, exteriorly, what is called "falling-off in the hind quarters"—small rump, and flat and lank haunches.

A large or wide pelvis throws the hips further apart, making the animal "broad-hipped," or, as he is denominated when the hips are unusually prominent, "ragged-hipped;" there being, as would appear in the latter case, some deficiency of muscle. Within limits, breadth across the hips is desirable. Cart-horses can hardly be too broad and big about their hind quarters: not so, however, with horses intended for speed. For it must be remembered, that by the increase of the distance across from one hip to the other, the hip-joints, in which the femoral bones perform their motions, are also removed farther apart, wider from the centre of gravity; the consequences of which are, inability on their part to balance the machine and move it, in progression, with the same effect as when they are nearer together. The broad-hipped horse will "stand over more ground," crosswise, than the narrow-hipped one, and will, on that account, maintain a surer standing; but should he attempt in action to place his feet underneath his body at all centrically, he will only be able to take short steps in advance, and should he not

* See the skeleton at page 7.

attempt this, his wide gait must make his burthen the greater. Broad-hipped horses, in their gallop, cannot throw their hind feet centrically forward in progression in the way racers are required to do. They will possess stability and strength in action, but their freedom or extent of action will be diminished; neither will they possess the same facility in turning sharp or quick as horses of a different make. One of the broadest-hipped horses I ever knew belonged to an officer of the Guards, and of him great complaints were made about his "rolling and awkward gait behind," and his inability to "turn about and wheel round" with the required promptitude; the consequence was, that he lost his place as a charger, and was sold as a harness-horse. In a general way, horses measure about twenty inches across from hip-bone to hip-bone; though some will run as much in their measure as twenty-two, while others will not exceed nineteen inches. I do not find, as in human beings, any notable difference between the width of the pelvis in the male and female horse.

Although the race-horse may prove disadvantageously broad across his hips, I believe he will never be found either too *lengthy* or too *straight* in his quarters; by which I mean, the length and elevation of an imaginary line carried from either hip to the point of his quarter, or of another carried from the summit of his rump to the root of his dock. Such straight formation of quarter implies small degree of declination in the position of the pelvis, the effect of which is extension of the angles between the pelvis and the femoral bones, and correspondent increase of the distances between the pelvis and the stifles in front, and between the pelvis and hocks behind; thereby augmenting the dimensions of the muscles running between these salient points, and at the same time furnishing them with, under the circumstances, the greatest advantages in their action. Length and straightness in the quarters must, therefore, be regarded as characteristic attributes of the race-horse.

Genuine hackneys, and many good hunters too, possess quarters the reverse of this in form; more, in fact, like that of cart-horses; and, when it is considered that the former are desired for their walking and trotting paces, and the latter in their gallop to carry great weight, we need feel no surprise at this: blood quar-

ters would have given them increased galloping speed, but they could, with the augmented stride, neither have carried the required weight nor maintained the stability and firmness of step requisite for heavy draught, and, therefore, they would not have proved so valuable either upon the road or in the field. On this account the short-quartered horse is often to be preferred to the lengthy one, even for the purposes of hunting; though, of course, should there be found—as nowadays there often is, from our extensive increase of blood—lengthy quarters possessing the requisite strength, they will in the field surpass all the cocktails*. Still, do the latter retain one advantage over the blood-horse: with their short and strengthy quarters, they commonly inherit powers of leaping, and cleverness in getting over awkward places, for which the long greyhound-like quarter of the racer seems ill adapted. The same remark may likewise be made in respect to the manege: horses with racing-like quarters never perform so cleverly with their haunches as others; they have difficulty in getting their haunches under them, and from extreme elasticity, manifest "weakness" in them, on which account thorough-breds rarely turn out accomplished military chargers. We know that Irish hunters are proverbially good leapers; and they are remarkable for their short, high-rumped, any thing but handsome, quarters: withal, however, they perform wonders in jumping, particularly in the hunting field, and this they are enabled to do from great breadth and shortness, combined with uncommon muscularity of the hind quarters.

The cart or dray-horse, the cob, the hackney to carry weight, are all valued the more for their large, rotund, plump quarters. Lank or lengthy quarters, such as would be admired in a racer, are, in these horses, detractive from their worth and beauty; as much, in fact, out of character, as round and full quarters would be upon a race-horse. This shews how necessary it is, before we pronounce on the aptitude or inaptitude of these parts, to first determine the breed of the animal, or for what purpose he is intended. The quarters may be "good" of the kind, and yet of a character unsuitable to the breed or make of the horse, or they may be of a description in keeping with the breed and conformation of the

* Half-bred horses, with short round quarters, from their tails being carried erect, are commonly so called.

individual, and yet "bad" of their kind. The quarters of the thorough-bred may possess the due length and straightness, but may be wanting in defined boldness of projecture, and be deficient in muscularity, thereby flat and lank and powerless.

Again, the quarters of the cart-horse may be characteristically short in their various dimensions, but may prove defective in bulk and plumpness. The length of the loins must a good deal influence the make of the hind quarters: shortness and compactness in the one would ill consort, both in appearance and action, with lengthiness and elasticity in the other; and it is not often that we observe any disagreement in this respect.

We meet, every now and then, with horses whom we admire in every respect save that they "fall off" or are "plain" in their quarters. The rump is small and altogether out of proportion to other parts, or it is one of a "drooping" character; or else, from disproportionate breadth and squareness, and great prominence of the hips, the quarters assume an ugly "ragged" appearance. These broad and ragged quarters, providing the thighs and hocks are of strong make, in general possess great efficiency in action. Many of our best trotters, such as are known to be capable in this line of feats both of strength and action, will be found to have quarters of this description with extraordinary development of power in their thighs and hocks. A horse can hardly be made worse in these parts than to possess an extended narrow loin, rising in a line, rather concave than otherwise, from a dip in the back to the summit of the rump, with buttocks drooping from this elevation, having flat or hollow surfaces, and yet being lengthy in their dimensions, with a tail set on as low down as it is possible for it to be. Such a horse will be light-carcassed, tucked up in the flanks after work, and, from want of power in his propelling agents, prove incapable of "carrying weight" or "getting through dirt," or of dragging any thing in the shape of a load.

The hind quarters being the agents of propulsion of the machine in action, durst we attempt to consider them apart from the fore limbs, or to institute any comparison between the two, we should certainly rank them in the highest place in our estimation; i. e., for all purposes of work, a horse with "good" hind quarters and "bad" fore quarters ought, undoubtedly, to be preferred to one with the

reverse qualifications: he would carry greater weight, draw a heavier load, and probably not so soon tire. But, perhaps, as was observed on a former occasion, the hind limbs would do too much for the fore in action, and the consequence would be—from the fore legs not being able to act in consort with them and to "get out of their way"—falling down, forwards. Another evil might be, a most unpleasant jarring, stilty, falling-down sensation to the rider, amounting, perhaps, to a total unfitness for the saddle, and even incapacitating the horse for any thing but slow work in harness. After all, therefore, however efficient his "good" hind quarters may render him, want of any thing like commensurate "goodness" in his fore ones would render his admirable qualities behind of little avail. In fine, we may and do, for certain purposes, such as light pleasure riding and driving, &c., make good fore-quartered horses very useful, although their hind parts are any thing but what we would desire them to be; but, for the reasons stated, the reverse conformation proves now and then such as to render the animal totally worthless, unless it be, as I said before, to go a foot's pace in a higgler's or market-gardener's cart.

THE HAUNCH AND THIGH.

The divisions of the hind extremity are, the *quarter*, *buttock* or *haunch*, the *thigh*, the *cannon* or *leg*, the *pastern*, the *coronet*, and the *foot*: the joints connecting these parts to each other being, the *hip joint* or *round-bone joint*, the *stifle joint*, the *hock joint*, the *fetlock joint*, the *pastern joint*, the *navicular joint*, and the *coffin joint*.

When we come to examine the skeleton and consider the bones of the hind extremity in reference to the parts denominated "thigh" and "leg" in the living animal, we find the same discrepancy prevailing as was noticed on a former occasion in regard to the fore extremity. The *os femoris*, so named by anatomists because it corresponds to what in the human skeleton is the true thigh-bone —in the quadruped becomes an *os ischii* or haunch bone; while the *tibia* and *fibula*—the bones of our leg—appear in the horse as *ossa femoris* or thigh bones. Pursuing this analogical investigation, we discover the *heel* of man to be converted into the *hock* of

the horse; and the bones of the *hands* and *fingers*, by union, consolidation, and great additional length and development, to be made, in four-footed animals, into legs, pasterns, and feet. Man being the peculiar object of the anatomist's study, the prototype of all his other inquiries, the standard to which all his comparisons are referred, we need feel no surprise that the bones of the parts we are engaged in considering should have received names, according to horsemen's views, so inapplicable to them. To prevent any misunderstanding or mistake, however, we must continue these appellations; we must still call that bone which, in the living horse, constitutes part of the haunch, *os femoris*, and that which really forms the thigh, the *tibia*.

The appellations, *quarter*, *buttock*, and *haunch*, appear synonymous: at least it is difficult to say what distinctions they admit of, or to define where one ends and the other begins. Haunch or *hanch* is a French word, used to denote *cette partie du corps ou l'impoita la cuisse:* by us it is often used for buttock and thigh combined. Shakspeare, in his Henry the Fourth, has used the word in a sense and with a force of expression peculiar to himself alone:

> "Thou art a summer bird,
> Which ever in the *haunch* of winter sings
> The lifting up of day."

When we say a horse has "fine haunches," we mean to include his thighs and buttocks: the thigh of the horse indicating the part of the limb extending from the stifle to the hock.

The OS FEMORIS, the lower haunch-bone of the quadruped, is similar in its shape and relations to the same bone in the human frame, but is, in a remarkable degree, a *short* bone; whereas in man it is the longest bone in the body, long thighs enabling us to take long steps, affording increased space for muscle, and giving us peculiar advantages on horseback. Long thighs are likewise advantageous for quadrupeds; but in them, as has been already explained, the os femoris constitutes no part of the thigh. Though articulated by means of a ball-and-socket joint with the pelvis above it, and by a condyloid or hinge-formed joint with the tibia (the true thigh-bone of the horse) below it, the same as in man,

still it is surprisingly short; at the same time, it is certainly the strongest bone in the body, on account of this shortness being combined with extraordinary development of its shaft and extremities. Had Sampson armed himself with the femoral-bone instead of with the jaw of an ass, he would have found his weapon for combatting the Philistines a greatly more efficient one.

Any disproportionate length of this bone in the horse would have thrown the stifle too low down, out of its natural and proper situation, which is on a level with the inferior line of the body and with the elbow, the joint in the fore extremity to which the stifle corresponds: the only augmentation in length the bone admits of being that which it derives from straightness in the quarters, or the least possible declination in the position of the pelvis. The straight and lengthy quarter, therefore, it is which has—providing the depth of the carcass be undiminished—the greatest length of femoral bone; the short and drooping quarter, the least. Here presents itself another instance to shew that when stride or speed is required length is given: a horse with long femoral bones will be enabled in action to throw his hind feet farther forward than another with short ones; that motion in the hip-joint which will advance the short bone as equal to three will project the long one as equal to four.

I said the hip-joint was of the ball and-socket character, and therefore it possesses, to a greater or less extent, a rotatory motion. Through its means it is that the animal has the power of "tucking his haunches in," or placing his hind foot centrically underneath his body, in the position, of all others, the most effective for the propulsion of the machine in action: unless from the breadth and position of the pelvis, and the connexion with it and conformation of the hind limbs, he derive this power from the hip joint, from no other joint, from want of the rotatory power, can such action proceed. It is quite a mistake to suppose that such "tucking in" can be produced by the hocks, they admitting but of simple flexion and extension. Both the fore and hind extremities derive what faculty of lateral and rotatory motion they possess—the power of throwing the legs and turning the toes inward or outward in action—from ball-and-socket joints: the fore extremity from the shoulder joint, the hind extremity from the hip joint.

There is this important difference, however, in the construction of these correspondent articulations: the os humeri is placed beneath the scapula, in such a situation that the weight of the body comes directly upon its head; whereas, in consequence of the head or articulatory part of the os femoris, instead of forming the summit of the bone, being laterally placed, at a right angle to the shaft of the bone, the weight is transmitted, not perpendicularly upon the os femoris, but in an oblique or indirect line. One reason for this appears evident, in the different relations to the body existing between the shoulder and hip, the latter being in consolidated connexion with the body itself, the former attached only through the intervention of muscle. The lateral position of the hip joint serves, in a measure, to compensate for the want of that elasticity and spring which the shoulder derives from its muscular attachments, to counteract or mitigate any shock or concussion the limb may sustain in action, such as from jumping, &c. There is another and a greater advantage, however, resulting from this position of obliquity. At the time that the weight of the body is pressing with its greatest force upon the hip joints, from the pressure being sideways instead of perpendicular, their motions under the weight are, comparatively, easily carried on—the work of progression is saved that hinderance and difficulty which would have attended the direct imposition of weight upon these joints, to say nothing about the friction and wear from concussion the joints themselves must necessarily have sustained. A third reason for placing the head of the os femoris in an angular position, and setting it off from the shaft or body of the bone by means of a *neck*—for so the intervening portion of bone is called—is, that the joints might possess an enlarged sphere of motion. In the fore extremity, the scalpula itself being a moveable bone, the humerus did not require this; but in the hind, the pelvis being a fixture to the trunk, it was necessary to confer as much mobility upon the hip joint as was compatible with the strength required in it to carry the weight of the body and to guard against any risk of dislocation. Had anything like the force resulting from weight and action been in operation in the fore extremity the same as in the hind, the shoulder joint could never have admitted of the loose and superficial construction it at present, for the sake of motion, enjoys. It

must have been furnished with the deep socket and complete reception of the ball into it, which we observe in the articulation now under our consideration.

A beautiful contrivance, however, in defence of dislocation, whether it be likely to happen from the extensive motion enjoyed by the hip joint, or from the resistance it opposes to the force of the weight and shocks it receives, is the *round ligament*, as it has been named; a ligament or round cord, characteristically short and strong, one end of which is affixed to the centre of the spherical head of the os femoris, while its other end is rooted into the floor of the socket in which that head plays: thus in nowise interfering with the revolutions and turnings of the ball within its socket—in nowise limiting or abridging the movements of the hind limb, and yet most effectually, in all those varied movements, preserving the hip joint from dislocation. By the depth of the *acetabulum*, for so the socket in the pelvis is called—which in the recent subject is still further deepened by an edging of cartilage or gristle, whose flexibility admits of all the required latitude of motion; by the round ligament; and by the thick and powerful muscles by which it is on every side invested, is the hip joint preserved from displacement: indeed, without rupture or laceration of the round ligament it is impossible for dislocation to take place.

Another remarkable feature in the os femoris is the huge ill-shapen projection proceeding from its upper and posterior part, which has got the name of *greater trochanter*, by way of distinguishing it from a process much less in magnitude arising from the body of the bone. This protuberant portion of bone may be regarded in the light of an elbow, or a hock, or any other projection whose use is to serve as a lever of the most favourable description, compatible with the situation it is in and to the muscles to be attached to it. Into the great trochanter are inserted those powerful muscles which extend the haunches after they have been flexed and advanced underneath the body, and in this act of extension propel the machine forward: no wonder, therefore, that it should have been constructed, in respect to magnitude and position, in a manner to offer the greatest possible leverage. When we see the quarters straight and lengthy, and the stifles prominent and jutting well forwards, we may take it for granted that the

trochanters partake of the increased length of the femoral bones: the reverse of this—short quarters and drooping or rounded stifles—shewing that the femoral bones are short, and their trochanters likewise.

Taking a side view of the quarter, three prominent points attract attention; the *round-bone* above, the *point of the quarter* behind, and the *stifle* in front; which three prominences may be said to constitute the lateral boundaries of the quarter, and, by their relative distances from one another, and their degrees of prominence or projection, principally to determine its lateral form and dimensions. It will be remembered that the point of the quarter owes its existence simply to a process of bone; whereas both the round-bone and stifle are constituted of joints, are not fixed but moveable parts; not so much parts *from* which muscles act as *on* which their action operates. The round-bone joint we have already considered; we will now pass downward to the

STIFLE.

This joint is one of peculiar and beautiful construction—one from which it would appear the idea of that mechanical power and useful invention, the pulley, took its origin. The joint is formed by the adaptation of the lower or condyloid end of the *femoral bone* to the upper end of the *tibia*, with the super-addition, in front, of the *patella*. The condyloid projections of which the lower end of the femoral bone is constituted revolve within ovoid, shallow, cup-like cavities excavated in the top of the tibia; but so superficial are these cavities, or rather depressions—so incommensurate with the condyles revolving in or rather upon them, that, in the angular position in which the femoral and tibial bones relatively stand, were it not for the super-imposition of the patella, the front of the joint would be left dangerously insecure and entirely unprotected.

THE PATELLA, or stifle-bone, of the horse, corresponds to the patella or knee-pan of a man: their anatomical situation and relations are the same, and they answer similar purposes in both animal machines. However irreconcileable with any notions of relative situation it may at first appear to an unprofessional mind, the stifle of the horse is regarded by the human anatomist as his

knee, for the same reason that the veterinarian would look upon the knee of a man as his *stifle*. One grand difference, however, between these structures is, that, in man the femoral bone stands perpendicularly upon the tibia, whereas, in the quadruped the bones are placed at a right angle, almost, in regard to each other: a circumstance from which we may infer that the patella was not added for the purpose of making the joint complete so much as for the grand object of serving as a pulley and a lever to the muscles engaged in the important business of extending the thigh under the body and aiding in progression. The biped—man—is enabled to maintain his erect posture with comparative ease, or at little expense of muscular action, by means, principally, of large and powerful muscles inserted into his knee-pan: were the knees not kept straightened the stability and strength of the standing posture would be lost: when from weakness, or any other cause, the extensor muscles lose part of their power, so that the legs cannot be completely straightened, we know how insecure the standing is, to say nothing of the awkwardness and infirmness it occasions in progression. Even after a man has had fracture of one of his knee-pans, and the fractured divisions of bone have united—as they commonly do through the interposition of ligamentous substance—the increased length of the pulley and consequent diminished effect resulting from the contractions of the extensor muscles, occasions halting in the walk, and detracts from the stability of the standing posture. To the quadruped these observations are not altogether strictly applicable. Standing, as he does, upon four legs, and these being so placed that the body is mechanically supported by them, after the manner of a stool or form upon its four supporters, but very little muscular action is necessary to keep him standing; and although the muscles affixed to the patella contribute to this function, yet is that office comparatively trifling to the one they perform in the work of progression. When the hind limbs, through the agency of the flexor muscles, have been raised or flexed to their utmost, then do the extensor muscles come into play, projecting the limbs underneath the body, and pointing the toes forward, in order that they may become fixed points upon the ground, and serve as *fulcra* in the working of the machine onward.

We may, therefore, fairly ascribe three functions or uses to the patella. Firstly, it serves to complete the stifle-joint in front, and to protect it against injury coming in that direction. Secondly, it forms a pulley, playing over the condyloid surface of the femoral bone, and thus greatly facilitating the action of the extensor muscles. Thirdly, it may be regarded in the light of a process, though a moveable one, giving the muscles inserted into it the advantage of considerable leverage in their operation upon the thigh: consequently, the more prominent the stifle-bone is, the greater the power given to the muscles. Were there no stifle-bone existing, the tendons of the extensor muscles of the thigh would have to play over the bare condyloid cavity of the femur, under the disadvantage of increase of friction and loss of leverage; and had the bone been fixed instead of moveable, the projection from the head of the tibia must have been of a lengthy and awkward shape, and, withal, would not have conferred the same power and facility of action on the muscles which they possess at present. Perhaps nothing more strikingly demonstrates the utility of the patella than the accident of its *dislocation:* the bone has no sooner slipped out of its place than all power of extension of the thigh is lost; and the result is, dragging of the toe of the hind leg upon the ground, the animal having no power to advance the limb underneath the body. The bone, in being dislocated, has got into a situation in which it is rendered a fixture, and the muscles consequently become powerless. The instant, however, the bone is righted, all power and action are restored, the same as if nothing had happened.

The operation of the muscles implanted into the patella, and through its medium into the tibia or true thigh-bone, is, then, extension of the thigh, and thereby bringing the leg forward underneath the body, preparatory to the effort of progression; the act of progression itself being, as we shall hereafter discover, mainly effected by the muscles inserted into the hock, assisted, however, by those of the patella. Action in the hind extremity is commenced by a general flexion of the limb—flexion of the femoral bone on the pelvis, elevating the stifle against the body; flexion of the tibia and hock, raising the foot off the ground, and preparing the limb for projection underneath the body: then comes the act of straight-

ening to throw the limb forward, and the continuance of the same act it is, enforced by additional powers, which propels the machine in progression. A well-formed stifle is, therefore, a point of some importance, and the best-formed joint of this description is that which, from the sharpness of the angle between the femoral and tibial bones, is forced well forward and upward towards the body, and at the same time discloses through the skin the prominence of the patella, but particularly that of the rectus muscle above it. The prominence of the stifle, it is evident, must depend upon the obliquity of the position of the femoral bone, and the sharpness of the angle formed between it and the tibia: in one instance, the stifle will appear bold and obtrusive, abutting almost against the belly; in another, it will be seen situated low down upon the thigh, quite away from the belly; and this latter is the stifle of all others which indicates, as far as it and its connexions are concerned, want of power and action in the hind quarter.

THE THIGH, OR GASKIN.

What horse-persons now understand by the *thigh* of the horse is the part between the stifle and hock joints; a part, anatomically regarded, that corresponds to the human *leg*. In the young animal it is composed of two bones; but these bones are united by an elastic (cartilago-ligamentous) substance which, as the animal approaches the adult period, becomes gradually converted into osseous matter, until at length the two bones become in reality one and the same solid structure; so that in every horse of full growth it would be but in accordance with truth to say, the thigh was composed of a single bone. The tibia presents upon its superior end two ovoid superficial depressions, which are, by the addition of cartilaginous interventions, rendered deeper and better adapted to receive the condyles of the femoral bone, the one moving upon the other in extension and flexion, and having some little lateral motion. The lower end of the tibia is smaller than the superior, the bone tapering rather from top to bottom, and is shaped so as to accommodate itself to the construction of the hock-joint.

The chief considerations touching the thigh or gaskin are, its *position*, its *length*, and its *thickness* or muscularity. In accord-

ance with the harmony of natural formations, where the haunches are straight and lengthy the thighs become lengthy and receding: in horsemen's phraseology, they are well "let down;" and the consequence is, the hocks are *low*, and the cannons *short*. The hind quarter, in fact, altogether, has the turn and appearance of the greyhound, and is evidently well adapted for purposes of speed. And, providing all this be accompanied by the requisite substance or muscularity of parts, a quarter of such a character in a race-horse must be regarded as one of his very finest and most admirable points. This, in fact, it is that constitutes the veritable *blood quarter*—the quarter every man who is seeking after breeding and speed is ever looking for. And when found with "the thighs let down into the hocks," or, in other words, with muscle and sinew from upper end to lower, nothing can surpass it for speed in the gallop and bottom in continuing it.

I have observed that length and obliquity of thigh are, commonly, correspondent formations; but they are not necessarily so: we now and then meet with thorough-bred horses with straight and lengthy quarters, and extreme length of thigh, and yet the thigh is so *straight* that its line of descent approaches even the perpendicular. I remember a racer—"Wouvermans"—who was most remarkably straight and lengthy in his gaskins, and yet he performed with considerable *éclat*. In these cases, length of thigh affords great stride, and muscularity tells in maintaining it; but in the absence of obliquity it is impossible there can be that spring or elasticity in the movements which is likewise a great promoter of speed, and which must ever tend to render the production of speed less expensive to the animal machine. Some greyhounds are very straight-thighed; but hares and rabbits, and many other animals of great speed, possess extreme obliquity, as well as length, in the conformation of their hind limbs. It may be that the oblique hind quarters are the most suitable for efforts of bounding or leaping; and that, as such, they are of more value in hunters than in racers.

THE HOCK.

The hock—the old and proper spelling of which is *hough*—of the quadruped is the same as the heel of man; the os calcis being the bone, in both instances, by which the projecting parts, commonly distinguished by these appellations, is formed: the hock-joint, altogether, being correspondent to our ancle-joint. The joint, either as hock or ancle, is composed of six bones, being a sort of correlative structure to the *carpus* or knee; but why so many pieces enter into its composition is not very apparent, either in the instance of knee or hock, wherein, as far as the motion of the joint is concerned, but two appear absolutely requisite. In a situation where so many pieces are placed to receive the jar or shock, and where these pieces are reposing upon elastic cushions, concussion must, no doubt, be very much counter-acted; to my mind, however, this does not altogether account for the curious mechanism displayed in the instance before us, as well as in some other parts of the skeleton. The lower end of the tibia has two deep furrows or grooves running obliquely across it, and these are fitted with admirable precision to a pulley-like surface presented upwards by the main bone of the hock, the *astragalus*, upon which the tibia rests; and between these two bones, the tibia and astragalus, is carried on almost all the motion of which the hock is capable, they being excellently adapted for the work by the pulley-like articulation just mentioned. Where is the utility, then, of the other five bones? Whatever uses we may be able to attach to the remaining four, the purposes served by one of the five, the os calcis, become too obvious to admit of any question. *The point of the hock*, that lever of more power than any one in the machine besides, through the aid of which the muscles most of all others concerned in progression are enabled to perform their great work, consists of the *os calcis;* this of itself being the part, as I observed before, which commonly goes by the name of the hock. When horse-persons talk about horses having "good" or "bad" hocks, they allude, for the most part, to the position and length of this lever. I heard a man, a good judge, say on a race-course on one occasion, "Shew me the horses' *hocks*, and I will point out the winner." In

a word, if there be one "point" about horses of more importance than another—one that cannot be tolerated badly formed or imperfectly developed—that point is *the hock*. What, then, is it that constitutes "a good hock?" Firstly, and principally, it ought to be *large* in proportion to other parts: a disproportionably *small* hock can never prove equivalent in power to a large one of the same quality. On a lateral view, it should appear *broad;* and, on a view from behind, bulky and bony. And, then, the *point* or lever should stand boldly and prominently out from behind it, to a degree to give the tendinous cords affixed to it that set-off from the limb which enables one to trace them through the skin perfectly distinct—isolated as it were—from the substance of the thigh. "Bad hocks," such as want these "fair proportions," are deficient in breadth and boldness of feature, and have, in consequence of such deficiencies, a mean, gummy, unattractive aspect. When the hock, from want of boldness and projection in its point, is rounded behind, forming, in conjunction with the thigh and leg in their posterior outline, a sort of semicircle, the horse is said to be *sickle-hocked.* And when, from the breadth of the pelvis, or the inward direction given to the tibial bones, the hocks are positioned too near to each other, the hind cannons running forward and the hind toes turning outward, the horse is denominated *cow-hocked;* cows being remarkable for such conformation. The cannon, from the hock, should descend in a vertical line towards the ground; a position in which it has more extent of motion, both forward and backward, and one which gives to the hock its greatest power and efficiency in action. The longer the thigh and the more the hock "sets out" behind from the body, the greater the sphere of the action of the hind limb, though the power of the hock is weakened by the longitude of the tendons inserted into it. That is the strongest hock which, being of itself well-formed, receives the muscular substance, along with the tendinous cords, into its very substance, the two being knit closely and compactly together; or, to use the dealer's phrase, "the thighs being let down into the hocks." A horse with straight thighs will have *straight hocks;* and these, though their straightness cannot be regarded, abstractedly, but in a disadvantageous light, while they are the best or only kind which could have suited such a make of limb, may still

be good of their kind, and therefore are not to be condemned. The os calcis may be lengthy and prominent upward, and the lateral projections may stand well and clearly out from the sides, and the hock, though straight, may, as I said before, still be considered good.

Hocks, I must repeat once more before I conclude, are of that importance in action that they deserve, in our examinations, to command much attention from us. A horse may have very good hocks, and yet be so shapen in other respects as to be worth very little; but hardly any thing can compensate for bad hocks, the hock being in its operation that in progression which the oar is to the boat. Without power therein no horse can go well and long: he may possess action, but he cannot fail to prove deficient in strength and endurance.

The bones below the hock being the same in number and kind as, and similar in structure to, those below the knee, and their relations and uses being alike, there will be no need here to add anything to the descriptions already given of the cannon and splint, and pastern and sesamoid bones; and as every individual part of the machine, the foot excepted, has now been described, I shall, in the next lecture, take a review of the skeleton as an entire structure, entering more fully and practically than has been done before into the consideration of it as a machine intended for purposes of locomotion and the carriage of burthen.

LECTURE VIII.

THE PROPORTIONS OF THE HORSE.

In the construction of animal bodies Nature appears to have had two grand objects in view, utility and beauty. An all-skilful hand has so made every "living thing," that, with an exterior calculated to excite our admiration, interiorly it is furnished with every requisite for the performance of those functions for which it was created. How beautifully is this illustrated throughout the animal creation! How beautifully is it further illustrated throughout individual animal mechanism! Not an animal, not a part even of an animal, but what is made and fashioned after a manner excellent in design, inimitable in execution. In what the finite view of man regards as

beauty, no animal, man excepted, is allowed to exceed the horse: the well-known admired picture which David has drawn of him in the Psalms; the eloquent allusions Shakspeare and other writers of eminence have made to him; all attest the estimation in which these great observers of Nature held his form and qualifications; nor is "the noble horse" less admired and valued, in our country at least, at the present day.

Although beauty and utility, as regards animal bodies, on most occasions are found to go hand-in-hand, the rule is far from wanting exceptions. An individual part—the head, for example—may be small and faultlessly shaped, and yet the possessor of it, as now and then happens among human creatures, may not be highly gifted; on the other hand, a horse having a plain, even an ugly head, may possess high qualifications. Phrenologists may possibly set these facts in a different light, though as yet the practical horseman has not derived that assistance from the science of phrenology which more attention to it would probably afford him. With a view of arriving at a knowledge of that frame-work of animal machinery from which we might reckon on deriving the greatest power and speed, it was natural enough that any person engaged in such an investigation should seek for a model of a horse, and for one of that description which was known and proved to perform in the most superior manner; and having succeeded in finding such a model of perfection, it was but natural for him to set it up as a sort of prototype or standard, whereto others might be compared, and whereby their powers might be estimated. Considerations such as these appear to have prompted the first Professor of the Veterinary College, St. Bel, to set about and produce his work "ON THE GEOMETRICAL PROPORTIONS OF ECLIPSE." St. Bel's words in his "advertisement" are, "When first I employed myself in taking the proportions of Eclipse, I had no other object in view than to gratify my own curiosity with respect to the figure, extent, and direction of the parts which compose a race-horse, and to compare them with those of horses of different kinds, for the purpose of informing myself of the mechanical causes which conspire to augment the velocity of the gallop."—"Since it is true, that the construction and direction of the bony and muscular parts within determine the outward figure of the body, a table of proportions, collected from the best

race-horses, would be of great service;" and also "by means of this table, we should be enabled to establish the true conformation of the race-horse, and at any given time to discover whether the breed has improved or degenerated." That Eclipse was a race-horse of the first distinction, both for speed and bottom, no one will dispute. He won more and higher renown on the turf than any horse either before or since his day; and, therefore, St. Bel had a right to assume that his proportions were, as near as could be obtained from any one individual, such as a perfect race-horse should possess.

By the "proportions" of an animal body is meant the dimensions—the length, breadth, and thickness—of the various parts or pieces of which it is composed, in the relation that one part bears to the entire structure or to another part: for any individual part may possess in itself very correct relative dimensions, and yet be, as a component piece of an entire structure, out of proportion, or not in symmetry with other parts. The eye accustomed to view animals in regard to their make will in a moment detect any flagrant disproportion in the constituent parts of a body; and yet, were the same person asked what the proportions of the faulty piece in the structure ought to be, he could probably only answer you by a reference to the body he had been finding fault with. St. Bel, following a practice instituted by the great Bourgelat, the founder of the veterinary schools in France, was prompted by his example to carry these matters out of the mere pale of speculation, and to institute in the British school what already existed in the French, viz. a scale of perfect proportions whereto all horses might be referred, and by which they might be geometrically compared and computed. He had a right to view Eclipse, from his achievements upon the turf, as a horse, take him altogether, as near perfection as Nature in her strange and fanciful variety has made the animal; and he, therefore, adopted his admeasurements as those of the proper proportions of a race-horse. And in order that these proportions might be reduced to a scale, and so be made applicable to horses of all sizes, St. Bel, still treading in the steps of his great master, Bourgelat, first took the measure of the head of Eclipse, and by that measurement computed, in regard to length, all other parts of his body. Whether these chronicled proportions prove of any practical use to us or not, they will always serve to

represent what sort or stamp of a horse Eclipse was: a matter so difficult to determine with any exactness from any painting or print of him, knowing, as we do, that painters do not, in general, proceed in their works after any geometrical calculations.

We learn from LECOQ* that the first idea of "proportions" appears in an Italian work published in the sixteenth century; though to Bourgelat are we indebted for their establishment upon a rational basis. Following GRISONIE, Bourgelat assumed as his "unity of mensuration," the head of the animal to be measured; and this he subdivided into three parts, which he called *primes;* each prime into three *seconds;* and each second into twenty-four points; making, altogether, 216 subdivisions. Lecoq has reduced these subdivisions down to hundredths, and has submitted the following scale as that of Bourgelat, with some slight improvements, founded upon changes in the position of the head and that of the hind quarters.

The height of the horse, measured from the poll of the head to the ground, is estimated at three heads' length; from the top of the withers to the ground, at $2\frac{1}{2}$. The distance from the point of the shoulder to the point of the quarter, at $2\frac{1}{2}$ heads' length. The height from the summit of the croup to the ground at $2\frac{38}{100}$. From the summit of the withers to the point of immersion of the neck in the throat $\frac{66}{100}$. From this last-named point to the point of the shoulder $\frac{82}{100}$. From the same point to the mane, half a head's length. From the withers, in a horizontal line, to a level with the lowest point of the back $\frac{66}{100}$. From the last-named point, still in a horizontal line, to a level with the summit of the croup $\frac{66}{100}$. From the summit of the croup, extending the same horizontal line, to a level with the point of the quarter $\frac{66}{100}$. From the point of the quarter to that of the stifle $\frac{82}{100}$. From one haunch to the other in a direct line $\frac{82}{100}$. From the point of one shoulder to that of the other in a straight line $\frac{66}{100}$. The greatest breadth of the belly, in a straight line, equal to one head's length. The depth of the body, from the lowest part of the back to its greatest dip, the same. The depth from the summit of the withers to lowest dip of chest, 1 head $\frac{22}{100}$.

* Traite de l'Exterieur du Cheval et des Principaux Animaux Domestiques.

From the summit of the croup to the stifle $\frac{82}{100}$. From the stifle to the hock $\frac{82}{100}$. From the hock to the ground $\frac{82}{100}$. From the withers to the stifle 1 head $\frac{64}{100}$. From the summit of the croup to the elbow 1 head $\frac{64}{100}$.

Two questions will naturally arise in the mind here: one is, can any rules of proportion be ascertained and laid down that will prove of service to us in practice?—the other, supposing such rules can be framed with any prospect of practical advantage to us, upon what basis or determinate measures ought they to be founded? I will not offend the accomplished "judge of horses," by saying that he is likely to derive much benefit from the study of any rules of this kind, however accurate their character; but I will go so far as to give it as my opinion, that the student of veterinary medicine, or tyro in practice, might gain from attention to such rules that sort and amount of knowledge which would put him, in the course of a short time after his application of them to practice, into the possession of that knowledge which the "judge" had only been able to arrive at either through extensive and manifold observation or a lengthened course of practice. In a word, the student or beginner in such matters would, I do not hesitate to affirm, gain much ground by making that a study, so far as he could do so, which his older professional brethren had obtained but through great opportunities of experience or years of attentive observation. To give a familiar illustration of this:—a man unread in equestrian matters is not supposed to know what parts should be long or what short, in the well-formed horse, or what parts should be large, what small: he might imagine it to be an affair of little moment, whether the head were large or small, the neck long or short, or think that short arms and thighs and very long cannons were as good as the reverse conformations. But a man whose mind had been previously furnished with some notions of proper proportions could never run into these palpable errors. Theory would have taught him differently, and practice would speedily convince him of the truth or untruth of what he had learnt. So far, rules of proportion may prove serviceable: so far, and no farther, do I recommend them to attention.

As every part of the animal machine, to be in just proportion,

must not only correspond in its dimensions with the adjoining parts, but be likewise commensurate with the magnitude of the entire structure, it must be evident that we shall not be able to determine this just proportion with any thing approaching geometrical precision, unless we possess some definite measure or scale wherefrom to proceed. The French school, we have seen, took the *head* of the horse as a standard whereby all the other parts were to be measured, and whereto they were to bear certain proportions: others, however, objected to this standard, and assumed the *height* of the animal as the proper primitive measure. In either case a great difficulty presents itself, and St. Bel experienced this. "Nature has so diversified the forms of individuals," says the Professor, "that no common measure can be made to apply equally to every species."—"If each species has its own style of beauty; if even each individual has its own peculiar beauty; if it is not possible to find two horses that perfectly resemble each other, we cannot pretend to assign any one form preferably to another as the rule of beauty for the horse. Were persons the best qualified to endeavour to collect together the different beauties dispersed among the different individuals, they might, indeed, compose a model of each species sufficiently perfect to direct the painter or the statuary, but which would deceive any one who would venture to choose a horse by it for his own use." At length, however, St. Bel met this difficulty by paying no attention to what in form is called "handsome," but solely to "that mechanical construction of the animal from which result the possibility and extent of those motions by the means of which he is enabled to transport himself from one place to another with greater or less speed."—"Eclipse was never esteemed handsome; yet he was swift, and the mechanism of his frame was perfect." St. Bel had a right to come to these conclusions from the performances of Eclipse; and yet the proportions of this celebrated horse varied from those of the standard of the French school, setting up, as it were, another standard in the English college.

The French school, I repeat, regulated their scale of proportions of the horse by the measure of the head; this regulator, however, has by others been objected to; they arguing that it was more in accordance with nature to assume the *height* of the animal

as the *datum* of their calculations. It is an easy matter to prove both these methods of proceeding erroneous: the simple question seems to be, which is the least so. In one mare, for example, whose height is sixteen hands, the head measures, from poll to muzzle, twenty-nine inches; in another mare, of similar breeding and height, the length of the head is but twenty-five inches and a half, and we all know that horses of the same height may have backs long or short, legs long or short, &c. Still, as I have observed before, this is not a sufficient reason for us to cast away and despise all rules of proportion as worthless. To all general rules, there are few or many exceptions, and there certainly seem no cases in which general rules can be applied with so little success as in the form and action of animals. Even suppose we could estimate the length, and breadth, and thickness, of every part concerned in action, to the greatest exactitude, still are there other most material circumstances, such as the peculiar texture and construction of the parts, and the amount of vital energy with which the parts are endowed, that regulate in an unknown and incalculable manner the faculties and powers of action and endurance possessed by the animal.

Of all individual parts the head is that which earliest attains its dimensions, and which is the least affected by that growth of the body which depends so much upon the circumstances of food, situation, &c. At two years old the head appears to have attained its full development; and, I should say that, as there is less variation in the longitude of heads than in the heights of horses, the head, as an independent part, affords the best primitive measure we can obtain for the foundation of our scale of mensuration.

THE PROPORTIONS OF ECLIPSE.

I must confess I feel some surprise that no person since St. Bel's time—none that I am aware of—has seriously taken up this subject: at least it must be admitted to be an interesting one; one, I think, that may be turned to some useful account; and I only wish it had fallen into better hands than mine. All who feel interested in the annals of racing, and in that science which makes us, on geometrical or mechanical principles, acquainted with "the form and action" of horses, cannot fail to seek with some eagerness

what can be learnt about "the best horse that ever lived;" and every such person must feel a debt of gratitude to St. Bel for having, so far as he has, rescued the remains of Eclipse from oblivion, in having left us *data* concerning his shape and action, in number and nature sufficient to enable us at this distant day to infer what kind or description of a horse the paragon of racers must have been.

In St. Bel's "Table of the Geometrical Proportions of Eclipse," the head is "divided into twenty-two equal parts," and thus divided it becomes "the common measure for every part of the body." Aware, however, of the fallacy of this standard, St. Bel adds, "If the head appears too long or too short in a horse, that common measure must be abandoned, and the height of the body taken from the top of the withers to the ground." Lecoq finds the same difficulty, and instructs us in such a case to assume as the "unity of mensuration," two-fifths either of the height or of the length of the body; from which it would appear that the head is to be presumed to be of its proper longitude, when two lengths and a half constitute the measure of either the height or the length of the body of the animal.

We are told by St. Bel, that Eclipse measured 66 inches—16½ hands—in height; and that he stood higher by an inch behind than before; and that this great height was still exceeded by the length of his body, that being three inches more, or sixty-nine inches. It is but rarely that we behold a horse of these dimensions, even among the big Derby colts of the present day; and when we come to add fair proportion and power and energy to this gigantic frame, we shall not feel so much surprise at his wonderful exploits. What appears most remarkable, however, in the "proportions" of this famous horse, is the smallness or shortness of his *head*, it measuring, according to calculations readily deducible from St. Bel's mensuration, but twenty-two inches; a circumstance, seemingly, that gave rise to his subdivision of it into twenty-two parts, each part then being equivalent to one inch. Hence Eclipse's height being sixty-six inches, was equal to three heads' length, exceeding that of the scale or regular-proportioned horse by half-a-head; and the same excess, and three inches added to it, occurs in his length: circumstances mostly, I repeat, attributable to the smallness of his head. Eclipse,

consequently, was a tall horse and a long horse, a horse higher behind than before, and, withal, a horse possessing a very small head.

Either, therefore, there is something fundamentally erroneous in the standard of the French schools, or else Eclipse must have been, in his head or other parts, out of proportion. Considering that he stood sixteen and a half hands high, and that his head measured no more than twenty-two inches, we need feel no surprise that, while other horses, according to the scale, were but three heads' length in height, he measured three and a half heads. I say this will account for his apparent out-of-proportioned tallness, but it will not account for his neck measuring thirty-three inches, or being equal to one and a half head's length. The regular proportion of the length of the neck being one head, we can in nowise account for the eleven inches in excess by supposing that the head was two or three or even four inches shorter than heads in general; and therefore the inevitable deduction is that Eclipse had a long neck, certainly a most desirable formation in a race-horse. His neck, as well as being *long*, was likewise well-proportioned; for it measured in width twenty-two inches at its junction with the shoulders, and yet was but a foot across at its union with the head, shewing how beautifully it must have tapered upward: whether it was of the *rainbow* shape, or was *straight*, is not quite evident.

The head of Eclipse must have partaken a good deal of the Arabian character; and no wonder, since, on the side of his dam, he is only the sixth remove from the pure Arabian: his dam being got by Regulus; his grandam by a full brother to Wildman's Squirrel; his great grandam by Lord Darcey's Montague; his great great grandam by Hautboy; his great, great, great grandam by Brimmer, son of the Oglethorp Arabian.

*Below** the eyes, St. Bel informs us, it measured, across, one foot; but from one eye to the other only seven inches; shewing that along with this extraordinary breadth of forehead his eyes were well placed, towards the centre of his head: points not only of utility, but of beauty likewise.

The breadth of the lower or posterior part of the neck (twenty-

* This must be an error. The measure must have been taken *above* the eyes, from one orbital arch to the opposite.

two inches), with the measure of the scapula, eighteen inches, and the largeness of the chest, are circumstances sufficient for us to come to the conclusion that Eclipse possessed *some depth of shoulder;* it was likewise *oblique*, for its angle of inclination amounted to 70°: in fact, all the fault St. Bel could find with the shoulder appears to have been, that it was "too much loaded;" a fault, if fault it be, that certainly denotes strength, and one which, I feel no doubt, many racing people would prefer to "a fine shoulder."

Eclipse's body measured, across its middle, twenty-six inches in depth, and the same in breadth; consequently he must have possessed "a circular barrel;" and his girth, around the *middle* of his body, at least, must have been—taking twenty-six inches for the diameter of the circle — seventy-eight inches; a circumstance which, unless we take it to have been that of the bare bones, or of a horse drawn or fallen away, certainly presents nothing extraordinary. There must have been a remarkable squareness about the body of Eclipse, inasmuch as lines running transversely from the withers to the stifle, and from the summit of the rump to the elbow, proved of equal lengths. What his actual girth was does not appear; but, according to the depth of his shoulders, it is evident he must have been deep in his chest, or let down in his brisket; and that his circularity of chest did not prevail in the fore parts, so as to throw his fore limbs wide apart, is certain, from the measurement of the interval between his arms being no more than seven inches.

The dip in Eclipse's back does not appear to have exceeded much two inches; it might, according to St. Bel's account, have been three inches; so that he could not have been a horse that "rose" much in his withers: his height was sixty-six inches, and he measured two heads and twenty parts, or sixty-four inches, in the middle of his back, just posterior to the place of dip; for which I allow (too much, perhaps) an inch, making the amount of dip, as I said before, at the very utmost, three inches. From the place of dip, the line of his back inclined (in a curve) upwards, rising at the summit-point of his quarters to one inch higher than he rose at the withers, from which it very gradually declined, but not with much incurvation, if any, to the tail. Eclipse, therefore,

had a back roached rather towards the loins, but *straight* quarters, and, as we shall find, also *lengthy* quarters.

What we have to admire, as much, perhaps, as any points in Eclipse, is the length and breadth of his arms and thighs: he being, in the fullest sense of the words, a large-limbed horse. His arm measured, across, from the front to the point of the elbow, the surprising breadth of ten inches, and was longer by two inches than, according to the length of the entire limb, it is in horses in general; the measurement, by the scale, being equal between the elbow and bend of the knee, and the latter and the ground: immediately above the knee the arm measured five inches across, shewing that it preserved its great breadth all the way down.

For the relative lengths of the different parts of the fore limb, we must content ourselves with St. Bel's measurements of the bones. The radius was sixteen inches long, the cannon-bone twelve inches; the pastern, coronet, and coffin-bones, together, seven inches in length: from all which it seems, according to the measurement of other horses, we may infer that Eclipse had, with his long and broad arms, short cannons, and by no means lengthy pasterns.

There must have existed considerable harmony of proportion, and consequently beauty of form, in Eclipse's hind quarters. A line extended from the summit of his rump proved the measure of another passing from the root of the tail to the stifle, to a second drawn between the latter point and the hock, and to a third from the hock to the toe of the hoof. The breadth of the thigh, "taken below the fold of the buttock," was great, ten inches; the same as the arm across at the elbow. Likewise there was great extension between the point of the hock and the bend of the ham, the measure being eight inches; shewing Eclipse must have been the possessor of extraordinarily broad or good hocks, a point of the very first importance in a racer. The cannons and pasterns measured, as is always the case, longer in the hind than in the fore limbs.

Eclipse's limbs were not only large, but long: he must have been what is called a "long-legged" horse; for St. Bel tells us, he measured forty-one inches from his elbow to the ground; leaving but twenty-five inches—his height being sixty-six—in a perpendicular line to the top of the withers; and as the general rule

is, that horses should measure equal lengths from the fetlock to the elbow, and from the latter to the withers, if we subtract the length of the pasterns and foot, altogether, say nine or ten inches, or even a foot, we shall still have an excess of length of limb. After we have been told, however, that his chest measured twenty-six inches in diameter, there appears something rather irreconcileable with the statement that from the withers to the elbow is but twenty-five inches. It is not my desire to impugn St. Bel's "table," though I must say that in this, and one or two places besides, there appears some discordance in his admeasurements.

We may, however, I think, safely receive as matter of fact the following summary:—

Eclipse was "a big horse" in every sense of the words: he was tall in stature, lengthy and capacious in his body, and large in his limbs. For a big horse, his head was small, and partook of the Arabian character. His neck was unusually long. His shoulder was strong, sufficiently oblique, and, though not remarkable for, not deficient in depth. His chest was circular. He rose very little in his withers, being higher behind than before. His back was lengthy, and over the loins roached. His quarters were straight, square, and extended. His limbs were lengthy and broad, and his joints large: in particular his arms and thighs were long and muscular, and his knees and hocks broad and well-formed.

That which, however, constituted, in St. Bel's eye, "the most beautiful and important quality of his structure" was the perpendicular lines drawn through his fore and hind limbs: indeed, so perfect were they, that "they may serve," adds St. Bel, "as rules in the choice of the best racers."

THE FIRST PERPENDICULAR falls from (what we call "the point of the shoulder") the articulation of the humerus with the scapula, precisely upon the front of the toe.

THE SECOND falls from the upper part of the fore-arm or elbow to the heel of the fore foot, dividing in its course, longitudinally, the fore-arm, knee, and cannon.

St. Bel's third perpendicular is but a part of his second; and his fourth drops equidistant between the fore limbs. We, therefore, shall pass to

THE FIFTH, which falling from the point of the stifle, according

to the regular scale, should come in contact with the toe of the hind foot, but in Eclipse struck the ground *half-a-head's length* (eleven inches) *in front of the hoof.*

THE SIXTH descends from the point of the hock, along the tendon of the hind leg, and, touching the heel of the fetlock, falls to the ground behind the heel of the hoof.

THE SEVENTH falls equidistant between the hind legs.

THE EIGHTH AND NINTH have reference to the body. One falls from the withers to the ground, touching the point of the elbow in its descent; the other from the middle of the back, through the body, to the central point of the quadrilateral figure described by the position of the four legs.

All these perpendiculars proved true in Eclipse; one alone differed from those of the approved scale, and this difference, we shall find, was attended with advantage: indeed, Eclipse's formation in this respect would appear to have corrected a grand error in the geometrical figure of the French schools.

In describing the differences between the proportions of Eclipse and those of the table of the French schools (which he reckoned to be five, viz. extraordinary height, both of head and body; extraordinary length of neck; the perpendicular from the stifle; and the greater length of arm) St. Bel omitted a very important difference, deducible from his own statements, which is, extraordinary length of limbs compared with the depth of body. St. Bel's admeasurements, as far as they go, have no doubt enabled us to make out what sort of a horse Eclipse was; but his mensuration might, in such a case as this, with much advantage have been carried a great deal farther—might, for example, in the instance of the limbs, included the circumferences of different sections, and, in many other parts, their relative span or thicknesses—also due allowances ought to have been made for the age and condition of his subject. He tells us, he "took the proportions of Eclipse while living, and satisfied his curiosity after his death upon his skeleton, by dissecting his body himself."

It may not be out of place, or unacceptable, to conclude this account of our prodigy of horse-flesh with the remarks, that Eclipse lived to the age of twenty-six, and died of "a violent cholic," on the 27th of February, 1789, at 7 o'clock, P. M.; and that, after a

very minute post-mortem examination, St. Bel came to the conclusion that his death was owing to disease of the kidneys, combined with "violent inflammation of the bowels;" and found that his heart weighed fourteen pounds*.

LECTURE IX.

ACTION.

Properly speaking, the phrase *locomotion* denotes the faculty an animal possesses of transporting his body or moving himself from place to place; the term *action* expressing his mode or manner of doing this. No horse, in his healthy or normal state, is without the power of locomotion; though there are only certain horses that, in the estimation of the connoisseur, possess action. Action, however, is not infrequently used in a *generic* sense, being then synonymous with locomotion; the kind of action being expressed by such epithets as *good, bad, high, low, round, darting,* &c., and this is the sense in which I purpose employing it on the present occasion.

For the performance of action or locomotion, two sets of structures are needful: one, which is passive, *the bones,* I have already had under consideration; the other, the active power, *the muscles,* I shall now consider.

THE MUSCLES.

The flesh investing the osseous fabric of an animal body proves, on dissection, divisible into numerous distinct pieces or portions, various in shape and magnitude, and so disposed that, through a power every portion, independently, possesses of contracting or shortening its length, the bones by them are flexed or extended one on the other, according as is required for the purposes of action or locomotion. That inimitable piece of mechanism, the skeleton, is, as we have already seen, so constructed as to admit of the bones,

* Notwithstanding this—as it appears it must have—including the blood the heart contained, still the weight must be regarded as enormous.

through the means of their joints, moving upon each other, to that extent and in that direction, which is needed for the action of the parts; and the muscles or acting powers superadded to it, are so applied and distributed upon it, that, while they are enabled to move every part in the manner it was designed to move, they, so far from encumbering or disfiguring the frame-work, confer upon it beauty of form and handsome exterior. It is true that the muscles might have been placed greatly more to their advantage as moving powers; but in such case not only must outward appearances have been sacrificed, but the form of the animal would have turned out such as would have materially interfered with his present functions and uses: thus what he had gained in power he would have more than lost in inaptitude and encumbrance.

The bones, in their figure and in the construction of their joints, offer every facility compatible with the general form of the animal, to the agency of the muscles, the power of the latter depending upon that facility, which is greater in some subjects than in others, and upon their own magnitude and texture. The principle upon which movement is effected is that of the mechanical power of the lever—the greater the leverage presented by the bones, the greater the effect of the action of the muscle upon it; and as muscles, generally speaking, possess power commensurate with their size, the larger the muscle the greater its power of contraction or action. These are the two leading principles on which depend the powers or strength of an animal; there is a third, also to be taken into consideration, which is the texture of the muscle, the quality of its fibre or component parts. That horse whose bones are so formed and arranged as to offer the longest or most advantageous levers, will, *cæteris paribus*, prove the strongest or most powerful: supposing, however, his muscles to be deficient in power, from wanting bulk, or from being lax or adulterated in composition, his length of lever will prove of little profit to him. The same may be said in cases where the muscles are powerful, but the leverage short or upright, and consequently disadvantageous.

In the course of our investigation into the quality of bone in horses of different breeds or kinds, we detected a manifold difference between the solidity and texture of the bone of the cart-horse and that of the race-horse; and if we prosecute our inquiries still

further, we shall find some such difference existing between the muscular fibre of the high and that of the low bred animal. In proportion as the fibres of flesh run fine and free from adulteration of adipose and cellular tissue, so are they apt and powerful in action. The heart is one of the finest and cleanest muscles in the body, being required to act with promptness, energy, and duration; and for the same reasons blood-horses are constituted of finer and cleaner muscular fibre than cart and mongrel-bred horses.

Independently, however, of original constitution, muscular fibres will be large and clean and fit for action according to the exercise or work they may have been in the habit of performing for some considerable time past. When we hear it said that one horse (of the same breed) is "in condition," and another "not," we may take it for granted that the muscles of the one have, through a course of exercise and labour, called training, been got into that state of perfection wherein they are capable of performing double or treble what they could have done in a state of idleness or comparative inactivity; and hence it is that by all connoisseurs in horseflesh so much importance is ever laid upon *condition*. The same horse *in condition* and *out of condition* might be, without much hyperbole, pronounced to be quite a different species of animal; for not the muscles only, but the bones, and no doubt other parts as well, under such totally opposite circumstances, undergo, in the course of time, very material alterations in their composition. Indeed, to minute differences of texture existing between the organs of locomotion in animals of high and low breeding—taking into our account the amount of nervous energy either respectively possess—would appear to be mainly attributable those differences of action and capability so characteristic of the two breeds. The race-horse and cart-horse have the same number and shape of bones and muscles, the same locomotive apparatus, in fact, both as regards framework, jointing, arrangement, and distribution; and yet nobody expects the cart-horse to run a race, or the race-horse to go to plough or drag a brewer's dray. St. Bel took up this interesting question, and considered the explanation of it to reside in the respective *weights* of the animals and in the "mechanical arrangement" of the locomotive organs. His words are, "How different is the gallop of the large dray-horse from that of the race-horse! It

is with difficulty that the former moves his body to determine it into the place required. He gathers the ground heavily under him at each step, and the translation of his bulk is but tardily effected. The latter, on the contary, flies like an arrow from a bow, and scarcely imprints the ground with his shoe; often running over a space of four miles in less than eight minutes. These are, however, but individuals of the same class. The number of parts which conspire to effect their respective progression is the same in each; *but these parts differ in their bulk, their extent, and their direction;* from whence result different degrees of power in the levers which they form. So that we are not to imagine that the mass or weight is the only cause of his slowness, *which rather proceeds from mechanical arrangement of the parts,* whose relation and correspondence determine the extent of his motions." No doubt, allowances must be made for "the mass or weight" of the cart-horse as compared with the blood-horse: it is not so much, however, the dead weight of their bodies as it is the *bulk* of their frames—that which is spread out in the one being condensed and consolidated in the other, without any material loss of power or strength. A reduction of the bulk of parts, renders them not only actually lighter but fitter for conveyance through the air at a quick rate; and when this is effected with increased advantages of lever and facilities for motion, speed must result: the loss of strength not being commensurate with the gain of speed. What, however, as I said before, has as much or more to do with enhancing the animal's powers of speed and endurance than either his diminished bulk on any notable differences in the "mechanical arrangement" of parts, is the *difference of texture* between one and the other, combined with the endowment of a higher amount of nervous energy: for, regard the differences of structure or texture as we may, they are still of themselves insufficient to account for those excellencies which are comprehended in the phrase "blood" or "breeding"; and which we well know from experience will carry the animal through his labours when every thing else would fail. Vital or nervous endowment, mysterious and incapable of physical demonstration as it may be to us, must, therefore, ever be taken into the account of feats of action and endurance: and when large horses possess this fineness of fibre, together with the requisite nervous energy, we

know they will "beat" all little horses. Eclipse was, altogether, a stupendous horse; and with his powers and breeding combined, no competitor could live with him. The reason why, in general, little horses are better than big ones is, that they inherit a concentration of power and energy which the larger sort seldom possess: the moment, however, a breed of *good* large horses is discovered, the little sort cannot fail to fall into the background.

When we reflect on the quick and varied motion of which an animal body is susceptible,—the number of parts there are to be moved, and that every muscle or moving power necessarily has its antagonist muscle or power, we shall not feel so much surprise at learning that there are upwards of three hundred muscles distributed over the body and limbs, and that these vary almost in every possible degree in magnitude, and are of an endless variety of shape or figure. Being mostly for the purpose of locomotion, the majority and the largest of them run from the body to the limbs; and the hind limbs, from having a great deal more to perform than the fore, possess the largest and thickest masses of muscle. The parts called the *buttocks* or *quarters* being composed of muscles whose office it is to propel the animal onward in progression, necessarily possess great fleshiness and bulkiness. The fore limbs are slender compared with the hind, they having little more to perform than to support or sustain the fore half of the body, and head and neck, and not to do much work in progression. I said before, and I repeat here, that as muscles are worked or exercised, so do they become large or powerful; and this, independently of original formation, will go far to account for their increased size in the hind as compared with the fore quarters, as well as for their largeness or plumpness in animals in condition, and for their smallness or flabbiness in such as are out of condition. View the race-horse brought to the starting post in condition to run; mark his beautiful satiny skin, elevated into prominences by the muscles underneath, which appear distinct enough through it almost to admit of anatomical demonstration: then *feel* his muscles, grasp his crest and shake his neck, and mark how firm and hard his flesh is, and how whipcordy and clean his sinews have through training become; in fine, what a totally different creature he is from what he was before being put into condition to race.

THE STRUCTURE OF MUSCLES is *fibrous*. So many packets of fleshy fibres, constituting in reality so many lesser muscles, disposed in parallel lines, and united together into one mass of flesh, form a distinct and separate muscle. But these packets are divisible into smaller packets, and these again are resolvable into fibres of a still smaller description; and of what the ultimate or primitive fibres consist, or what their true nature may be, microscopical observers are hardly yet agreed, some contending that they are *tubular*, others that they are *beaded* filaments. Be which or what they may, during life they possess the power of contracting or shortening themselves; and through this vital property of contraction it is that all the motions and movements of the body are effected. The order or stimulus for muscular contraction is given by the brain, and conveyed to them through the medium of the nerves; and the action proves feeble or forcible, according to the nature of the order or the amount of nervous energy emitted into the muscle. What muscular contraction is, how the phenomenon is effected, remains, after a host of minute and searching inquiries, still problematic: we know little more about it than that it is present with life and absent in death, and that, therefore, it is not dependent on elasticity or any abstract physical force.

THE TENDONS or *sinews* with which most muscles are provided, and which are different altogether in their appearance (being white) and their texture from the muscles themselves, possess no power of contraction, neither are they elastic: they can neither shorten nor elongate. They are, in fact, simple cords connecting the muscles with such parts as they are designed to put in motion, and, being so much smaller than the muscles themselves, are on that account capable of being intruded into the composition of parts, without adding inconveniently to their bulk, or destroying their symmetry. Through the intervention of tendon, for example, muscles situated in the arm flex and extend the foot. Had there been no tendon or sinew, the fleshy parts of the muscles must have been continued to the foot, thereby rendering the leg an awkward-shaped appendage, as large round, or nearly so, as the arm itself. The "back sinews," as the flexor tendons are commonly called, are stout firm cords attaching the flexor muscles—forming the posterior part of the arm—to the pasterns and foot. The more promi-

nent and perceptible they are to the grasp of the finger and thumb, the "better" in kind we reckon them to be; and it is, perhaps, as good a criterion of their quality as we can have, that they "stand out well" from the cannon bone, feel tense, and hard, and clean, and perceptibly distinct from another cord, between them and the bone, *the suspensory ligament*, and that the leg altogether, below the knee, measures much in breadth and much in circumference.

MUSCULAR MOTION.

THE property possessed by an animal body of locomotion—self-movement—is of a nature altogether different from any we witness in machinery: how ingenious soever a piece of mechanism may be, and imitative of the movements of the vital machine, there is still this essential difference between them—that one moves through an extrinsic force or power communicated to it; whereas, in the other, the power of motion is created or generated. It is, in the strictest sense of the words, a self-moving machine, the other being but self-moved: and in the muscles reside the source of motion. They, during life, possess power of *contracting* or shortening their lengths, through which simple change all the movements of the body are brought about. What it is that enables them to contract, what alterations of structure or arrangement they undergo during contraction, is a question that has puzzled those who have made themselves best acquainted with their intimate texture and organization. We must, therefore, content ourselves with a knowledge of the established facts, that the self-moving power resides in the muscles, and is dependent on their vitality; dead muscle, or flesh, being devoid of any such property.

The contraction of a muscle has the effect of bringing nearer together the parts to which its ends or extremities are attached; either both attachments move in approximation, or, one being fixed, the other moves towards it. The tail, e. g. (which is a good exemplification of muscular action), is raised by the contraction of muscles running from the croup to its upper surface, called, from their office, the *erectores coccygis;* and is depressed by muscles running underneath, from within the pelvis to its under surface,

named the *depressores coccygis*. There are likewise two other muscles, one on each side, having the power of curving or flexing the tail around the quarter, either to the right or left side, according as the right or left muscle is in action. Altogether there are eight—four pairs of—muscles belonging to the tail: two for raising it, two for depressing it, two for forcibly compressing it against the rump, and two for curving it either on one side or the other. Less than eight muscles would have proved insufficient for the various movements of which the tail is capable, and with the eight, admirably arranged as they are, the tail may be made to perform movements in any radial direction of a circle; and, indeed, by the alternate action of them, to describe a sort of circular motion, such as we every now and then perceive when the horse is switching off flies, or making efforts to rid himself of any source of annoyance or irritation.

In the ordinary or natural manner in which a horse carries his tail, the action of the muscles may be said to be nicely balanced; none are forcibly contracted—none completely relaxed—all are in that semi-contracted, semi-relaxed condition, which, by physiologists, is characterized as their *tone:* and this tone is said to be *good* or *bad* according as, from previous exercise and other circumstances, they are in a condition to do much or little work. While a horse is going, the coccygeal muscles participating in the general action of the body, the tail becomes partially erect; but, while in the stable, every muscle ceasing to act, it droops from its own weight, and lies at rest against the quarters: and this is, in truth, the only *real* relaxation or repose these muscles experience; for, while the erectors are elevating the tail, the depressors are not passively relaxed, but, like hands employed in moderating extension, lest the part be over-stretched, are engaged in keeping up a proper degree of counter-extension. The operation of nicking plainly elucidates the effects of muscular action: the depressor muscles of the tail being severed, the erectors, every time the horse is set in action, elevate the tail to the uttermost, and maintain it thus preternaturally erected, there being no controlling powers to moderate the elevation.

Another effect of muscular contraction well exemplified by the tail, is, the prodigious force muscles are capable of exerting. All

practical horsemen full well know, that, to raise the tail of a strong-docked horse, requires often more than the strength of the strongest man's arm. Horse-dealers and grooms, indeed, and connoisseurs in horses, often take the strength of the dock (of the tail) as an estimate of the *general* muscular powers of the animal; and the criterion is one by no means to be despised, it being but reasonable to infer that great strength in one part would not be unattended with correspondent power in others.

The limbs of the horse furnish us with beautiful illustrations of the force and velocity, extent and variety, of muscular motion. In the fore-limb no less than thirty muscles are employed; eighteen being occupied in the movements of the shoulder and arm, the remaining twelve with those of the leg and foot. When speaking of the bones composing these parts, I said that between the shoulders the fore-quarters of the body were in a manner suspended through the medium of attaching muscles. There is one muscle especially designed for the performance of this function—*the serratus magnus*—a muscle of vast magnitude and power, which, though by anatomists regarded but as one, might with just reason, by the physiologist, be described as many; inasmuch as by such a supposition alone can he account for its unwearied discharge of the laborious duties assigned it. Its twelve distinct origins from the cervical vertebræ and ribs ought to be considered as twelve distinct portions of it; some of which are in continual action, while the others are recruiting their tone by repose. Another important duty performed by this muscle, and one in which it is probable most if not all of its divisions are engaged, is that of, during the action of the fore-limbs, fixing the central part of the scapula to the ribs while its upper and lower ends revolve, in segments of circles, backwards and forwards; the other muscles attaching the scapula to the trunk being employed in effecting the revolving movements.

With the exception of the joint at the shoulder, between the scapula and humerus, the joints of the fore-limb are so constructed that they can hardly be said to admit of any motions beyond those of flexion and extension; and therefore a very proper division of the muscles moving them has been made into *flexors* and *extensors*. It might be imagined that one or two of each sort would be all that was required for such simple movements; when, however, it is

considered that the knee-joint admits of some trifling lateral motion, and that through it some variety is given in progression to the direction of the leg, it will be seen that more became necessary to give steadiness and precision, as well as due force and effect, in action. The flexor muscles are more numerous and powerful than the extensors, because all action in the fore-legs consists in flexion: during extension the animal is standing still. There is an important extensile movement in the arm performed by *the extensor brachii*, whose point of insertion is the process we call *the elbow*, and which, in the living animal, is recognized by the remarkable plumpness of flesh immediately above that process, and before the girthing-place. Every "judge" of horses knows that prominence at this part constitutes an excellent "point;" it being of the very first consequence that the arm should be extended with force, and be firmly maintained in this extension, both on account of the projection of the limb in action, and for sure and safe alighting and standing upon it. When the horse is throwing his fore-legs straight out in the gallop, or projecting them, *dart-like*, in the trot, this is the muscle which, as far as the arm is concerned, is chiefly employed; therefore strength of action, if not extent of projecture, will mainly depend upon its magnitude or efficiency.

The muscles designed for the motions of the leg and foot are situated upon the arm—in the hind extremity upon the thigh; there being, as I before observed, no muscle or flesh, but tendon or sinew alone, below the knee and hock; and these muscles are inserted into the uppermost part of the leg, as close as possible to the centre of motion—the knee or the hock. Considering the length of the lever from either of these parts to the extremity of the hoof, it will at once appear to what a great disadvantage these muscles are acting; when we come, however, to reflect, that the tendons could not have proceeded in the straight or direct line to the foot, on account of the infraction upon the form of the limb, and that by the present admirable arrangement, though power be lost, velocity of movement is gained, and gained in a manner to compensate even for that loss of power, we shall discover that an all-wise hand has in the construction of these parts not only overcome every difficulty, but at once accomplished every desirable object. For every half inch of contraction of the muscle, and

corresponding half inch of space through which the leg revolves at the knee, the hoof at the extremity of the lever will move through a space equal in extent to as many feet, and the velocity of motion being augmented in increasing proportion, it is evident that the force with which the foot strikes the ground must be greater even than if the muscles had been prolonged and attached to the foot itself. The increased weight of the horse-shoe at the very extremity of this lever will, when once set in motion, by adding to the momentum, like the weight upon the fly-wheel, augment still more this force; though, of course, it will require greater exertion in the muscles, and so tend to tire the animal all the sooner. Short cannons, in reference to muscular action, are, therefore, preferable to long ones, because their leverage is less, and because with long arms there is greater length and strength of muscle; though it will be seen, from what has been said, that, in a mechanical point of view, they are not calculated to move with the same degree of velocity as long ones*.

The muscles of the back, loins, and haunches, are remarkable for their size and power, and for the important parts they perform in progression. It has been before observed, that, for strength, the loins should be "broad and rounded, the haunches fleshy, and the thighs let down to the hock† ;" all which amounts to nothing more than saying, that the muscles constituting these parts should be large and powerful, it being quite impossible that a horse of slender muscularity in these—the most important of all—parts, in proportion, can either "go," or "maintain the pace" as a hunter or racer; the loins being the parts from which, when the hind feet have been projected forward and placed to serve as *fulcra* upon the ground, the spring is made which impels the whole machine onward, and the haunches being the chief agents in the propulsion. In racers, as has been observed on a former occasion, the loins and hind quarters are considered as of paramount importance; in greyhounds, in the deer species, in hares, rabbits, &c., in fine, in all quadrupeds of speed, the same conformation is remarkably characteristic; plainly

* See what has been said about long and short arms and cannons in the description of the bones.

† In Lecture I.

shewing whereabouts the power for fast and efficient galloping should be lodged.

Although we are unable to account for the production of muscular motion, the principles directing its agency on the framework of the skeleton are clearly those of mechanics; the lever being the power according to the laws of which locomotion may be said to be effected. The bones constitute "a series of levers," on which the muscles operate with more or less advantage and effect, depending upon their length, their position, their prominences or processes, &c. Of levers we know there are three kinds; and of each of them examples may be found in the animal economy.

For instance, the extension of the fore-limb is effected on the principle of that description of lever in which the *fulcrum*, or axis, or centre of motion, is situated between the moving power and the resistance or part to be moved; whereas, in the flexion of the limbs, both fore and hind, in general, the power holds the intermediate place. When the arm is extended, the elbow-joint becomes the *fulcrum;* the point of the elbow, to which the muscles are attached, the *power;* and the limb itself the *weight* or *resistance.* When the arm is flexed, the elbow-joint is still the fulcrum, but the power is now transferred to the radius, the resistance being the same: thus furnishing us with an example of a lever of another kind, one in which the power is intermediately placed. A third kind of lever is exemplified in the extension of the hock, the foot being upon the ground: the foot now becoming the fulcrum, the point of the hock the seat of the power, and the resistance or weight to be moved forward, falling down the shaft of the tibia, operating upon the hock-joint. The same lever appears in the extension of the fetlock after it has been flexed in action for the purpose of pointing and fixing the toe in the ground, which then becomes the fulcrum, the power being exerted at the summit of the sesamoids, and the resistance bearing upon the large pastern. These laborious duties in the work of progression which the hind fetlocks, in concert with the hocks, have to perform, acccount for their failure in horses doing much heavy draught, or that have hunted or raced much in heavy grounds.

It being a law in mechanics, that any deviation of the direction of the power from a perpendicular line to the arm of the lever is

attended with a corresponding decrease of force, and that the nearer the power approaches to the parallel line with the lever the weaker its effect, so much of the force being consumed in efforts either to drag the lever against the fulcrum or force it off, it will at once appear evident at what a great disadvantage or sacrifice of power the muscles of the limbs, from their parallelism with the bones, are in general acting. This disadvantage, however, as I said before, is greatly compensated for by the velocity acquired by the length of the resisting arm of the lever, and the comparative shortness of that to which the power is affixed. Where power, however, is wanted, as in the hock and fetlock joints of the hind extremity, although celerity of motion is still preserved by the distance at which the fulcrum is removed from the power, the requisite force is gained by the proximity of the latter to the resistance. We now perceive the advantages derived from length of hock and length of elbow, and from broad or prominent fetlocks; we may also calculate to how much greater effect the muscles in the haunches and shoulders will act, where the bones are placed at right angles nearly to each other, and when, consequently, the power of the lever operates perpendicularly to its arm. In the case of the flexor muscles of the arm playing over the head of the humerus, and that of the extensors of the thigh playing upon the patella, pulleys are established, which, though of a nature too simple in themselves to afford any advantage as pulleys, yet increase the power of the muscles attached to them by giving a more advantageous direction to the power over the resisting arm of the lever. These beautiful contrivances are likewise attended with the convenience of permitting the muscles from which the power originates being placed out of the direct line of action, in situations where they accord with the contour and proportions of the limb.

LECTURE X.

THE ACT OF STANDING.

It might appear that the quadruped, with his four legs as props of support, was sustained *mechanically* in the standing posture, after the manner of a four-legged stool or form; and, nicely poised as his body is between them, and advantageously placed as the legs evidently are for its support, at first sight the animal structure is not unlikely to impart a notion of the kind. As anatomists, however, we know that the limbs, from the circumstance of their being made with joints in them would, were they not themselves sustained by some superadded power, bend and give way under the superincumbent weight, and let the body down; we know also that the faculty they possess of supporting the body is essentially a *vital* one, the dead animal losing the property of standing. It is from the operation of the living muscles on the bones that the animal derives the power of standing, as well as of moving; therefore it is that, when we speak of "the *act* of standing," we are correctly expressing ourselves, it being in a physiological point of view as much an act as walking, or trotting, or galloping is. Each limb is kept in a state of extension underneath the body by muscles, either themselves constituting part of it, or running from the body to be inserted into it; and though their actions or contractions come greatly short of what would be required for producing motion, still there can be no entire cessation of them without the animal falling. Some horses take their rest standing—never lie down. In these the muscles sustaining the limbs must be in continual action; and on this account it seems to me that such horses can never profoundly sleep, for if they did they would fall, the same as we see horses with lethargic affections occasionally doing. I have seen lethargic horses repeatedly fall from sleeping standing, even while they have been in harness. From which it would appear that a degree of consciousness is required even to sustain the standing posture; and, therefore, it is, I repeat, that it seems to me that horses who never lie down, although they may, and apparently do, sufficiently take their rest, yet never can sleep soundly or perfectly.

The act we have been considering I shall denominate *the standing posture*, to distinguish it from two other acts of standing, one of which I shall call *the natural standing position*, the other *the artificial standing position.*

THE STANDING POSTURE is that into which the horse throws himself for ease or repose, and in which one of the limbs continues in a state of flexion or absolute rest, and this almost invariably a hind one, while the remaining three are maintained in a state of extension; the fore legs being commonly sloped backward, as when the horse is said to be "standing over," that being the position—and not the perpendicular one—which to them appears to confer the greatest ease. In some rare instances horses—such as are "stilty before"—will stand with their fore legs advanced or stretched forward underneath them. It is by no means uncommon to find horses (that are not lame) standing, from habit, with one fore leg advanced in this manner, while the other is receded rather; and when this is done it is always the hind leg of the opposite side that is flexed; the animal from time to time reversing this position of his limbs, unless it be that his foot is pointed from pain or uneasiness, and then the same leg is kept in advance. So, under ordinary circumstances, first one hind limb is thrown into flexion, then the other, and in this manner are both recruited by rest: the fore limbs obtaining their repose, standing, by being carried backward out of the perpendicular, and by the dependency of the head and neck, which brings the scapulæ more upright, and throws all the weight possible upon the posterior parts of the leg where the elastic supporters are placed. When we were examining the fetlock joint, we found that the sesamoid bones supported a proportion of the superincumbent weight, and that this proportion was greater or less, depending on the construction of this joint and of the pasterns: we now find that it will be greater when the animal is standing over at rest than when his limbs are placed perpendicularly under him; and this is the reason of his placing himself in this posture. In this position the *suspensory ligaments* will be called into greater action, and consequently there will be a less demand for muscular force. The dependent position of the head shews the same thing: the muscles of the neck having to sustain the weight of it at the end of a long lever, become in a great measure re-

lieved of their burthen by the calling into action, through the elongation of the neck, of the elastic cords running from the withers to the poll. In the standing posture, therefore, Nature prompts the animal to ease himself as much as he can by imposing more burthen upon the ligamentous powers and less upon the muscular; and these last, moreover, experience occasional relief by alternation of their states from extension to flexion, from contraction to relaxation.

The posture of repose—that which the wearied horse instinctively assumes when left to himself—is to be distinguished from any attitude into which he may throw himself in a state of watchfulness, or excitement, or alarm; and this again is different from any artificial or unnatural position in which he may be placed by riding-masters or horse-dealers, or in which he may have been taught to place himself. The instant the animal's attention becomes attracted, the same instant may he be said to rouse himself from his dormant or listless repose, and assume more or less animation, simultaneously changing the standing posture for the natural standing position: beyond this, through the interference of art, the position may be changed again to what we call the artificial standing; and thus the three acts of standing become exemplified in the same individual. The riding-master teaches the horse to "stand upon all four of his legs," in order to be ready, at a moment's notice, to spring from the standing position into any movement or pace required of him; the horse-dealer teaches the animal to stand with his fore and hind limbs stretched out in such manner as to "make the most of himself" before a purchaser; and it is pleasing to behold with what sagacity horses who have been long or frequently in dealers' hands will acquire this artificial standing; equally so is it to see how military horses ranged in their ranks will stand on the *qui vive*, ready for a brisk and sudden movement at the sound of the trumpet.

THE ACTS OF REARING AND KICKING.

Though the limbs are the transporting agents of the body, it is not mere motion of them that will effect progression, much less motion of any one or two, or even three of them, without the other, that will produce it: all must move, and in moving change

places, otherwise the animal will remain in the same situation. The movements in progression are for the most part the result of the *alternate* action of the four feet; when the two fore legs are elevated into the air, the two hind remaining fixtures upon the ground, and the horse in this manner erects himself upon the latter, the act is denominated *rearing:* when, on the contrary, the hind legs are thrown into the air, the body being erected upon the fore feet in the opposite direction, the act is called *kicking*. But neither in abstract kicking nor rearing is there any locomotion—any progression or retrogression. In rearing, the fore feet, through the agency of the shoulders and fetlocks, spring off the ground, and are then lifted with the body into the air, the erection being effected through the contractions of powerful muscles running upon the back, loins, croup, and haunches, the hip-joints operating as fulcra or turning points. Some of the muscles or powers employed being between the fulcra and resistance, while others—those operating upon the hind quarters—being placed behind the fulcra, the levers, through whose agency the movement of rearing is effected, become those of the first and third description.

By persons in general, or, at least, by such as are unacquainted with the *manage*, rearing is often regarded as a vice in a horse. This, however, is a very erroneous view to take of the act. We rather ought to take the contrary, and regard a horse so made that rearing becomes, as it were, natural to him, and who consequently performs and repeats the act with ease and freedom, as, by proper management, convertible into an excellent hackney or charger, or hunter even, rearing being a component part of the act of leaping. I do not mean to assert that rearing, carried to excess or resorted to by the animal to shew resistance, may not prove a vice, and a troublesome and dangerous one; it is but seldom, however, that it turns out such; it is mostly controllable, and may, in proper hands, be turned to excellent account. Indeed, rearing constitutes so fundamental a part of many of the horse's school-taught movements, that, without it, either natural or acquired, the hopes of the riding-master in his education are disappointed: he can make nothing of his pupil but a common labour horse, suitable to drive, unsuitable for riding. Horses require strength of loins and haunches to rear readily and sustain themselves upon their hind quarters.

Short-legged compact horses generally rear and spring with more promptitude than others. Of all horses, thorough-breds are commonly the most untoward learners of the manage, on account of their deficiency in rearing powers; though I have known some notable exceptions to this. Were the riding-school art and practice carried far enough, there appears no good reason why a horse might not be taught to walk upon his hind legs and sit upon his haunches like a dog. Girard mentions, indeed, the instance of a stallion who, at the sight of the mare he was about to cover, was in the habit, of his own accord, of walking for some distance in this manner in his approach to her.

KICKING is the act the reverse of rearing: instead of the fore-quarters being raised, the hind ones are elevated. The muscles employed in kicking are much the same as produce rearing, the difference being, that the fore-quarters are now the fixed and turning points, the hind the moving parts. The shoulders become the fulcra, the hind-quarters the resistance, the power lying intermediately. Although kicking, like rearing, must be viewed, abstractedly, as a manifestation of power, yet it is a manifestation of a most dangerous kind, and one that cannot too early or too effectually be suppressed. From the circumstance of the act being much facilitated and enforced by the abasement of the head at the time—that having the effect of extending the muscles and so enabling them to act with more energy and effect—we learn that the elevation of the head is one of the best counteractions we can adopt in horses disposed to this dangerous vice: we see this well exemplified in dealers' and breakers' establishments; the moment any signs of kicking are evinced, the same moment the head is seized, and thrust up to the highest pitch.

THE ACT OF LEAPING.

THE LEAP is either a sudden spring into the air, in which the feet quit the ground simultaneously, or else it is an act compounded of an imperfect rear and kick in quick or slow succession, according to the manner in which it is performed. The leap can hardly be regarded as an act of progression: commonly, it being in a forward direction, undoubtedly progress is made by it; but it is

possible for it to amount to no more than a jump or a bound off and upon the same ground, as is the case when a horse is said to "buck" in his leaping, *i. e.* to come down upon or near to the spot from which he arose.

BORELLI commences his chapter "*de saltu*" with the proposition that *no leap is made without the joints of the feet being first flexed**, and instances man as with straightened limbs being incapable of leaping. Brutes and insects, however, from having their joints already flexed, can leap at pleasure†. Horses with their flexed fetlocks and angular haunches and shoulders, are ever ready to spring off the grounnd, and the more lengthy and angular these parts are, the greater the animal's power of jumping‡. We see this well exemplified in the deer kind, and in rabbits and hares, and especially in kangaroos, but most beautifully of all in many of the insect tribe§. Horses take leaps with most facility and effect when cantered or galloped at them at a moderate rate, because in that pace they are already prepared to jump, the leap itself being, in fact, but an extraordinary effort of spring and stride made after the manner of, or thrown into, the gallop. The effort made by the extensor muscles to effect the bound into the air is succeeded in the air by a contraction of the flexors: both the fore and hind limbs are in the air drawn up towards the belly, in order that the leap be effectually cleared. No sooner, however, does the descent commence than the fore limbs become spread out forwards and the hind ones let down, wide apart, to receive the body at the landing, and by their yielding position to ward off or mitigate, as much as possible, the concussion consequent on coming to the ground.

LECOQ has happily represented the directing power of the head and neck in the leap:—"The elevation of the neck governs the direction of the leap. If the animal, in order to clear an obstacle,

* Saltus non fit, nisi priùs articuli pedum inflectantur.

† Bruta et insecta aliqua, quæ omnium pedum aut saltem postremorum articulos semper inflexos retinent, possunt ad libitum saltare.

‡ Quò longiores sunt vectes extremi crurum, saltus majores fiunt.

§ Hinc est, quod locustæ, grilli, et pulices longos saltus efficiunt, quia nempe eorum pedes posteriores valde prolixi sunt, ut æquent aut superent longitudinem ejusdam animalculi. Contra in hominibus et quadrupedibus.

wishes to leap high, he erects his head, and by this simple movement, the fore quarters pressing back upon the hind, a vertical direction is given to the spring. If, on the other hand, he only desires, as in the gallop, to leap in a direction forward, the neck levels itself on a line with the ground, and the head, stretching forward to the utmost, carries the centre of gravity along with it, and thus aids the projection; the hind quarters propelling the body, raised from the ground to a height only sufficient to enable the limbs to clear the leap."

It will be seen from what has been said, that a horse will take a leap after two different modes: he will, as the phrases go, take it either "standing" or "flying." "A standing leap" is taken, without any preparatory run, from the ground the animal is actually standing upon. Finding it a difficult matter to spring up from the ground with all four feet at once out of a state of rest, he first rears to the height required to clear the leap, and then, with a sort of kick, flings his hind feet after; the leap altogether being, as I observed before, a compound of a short rear and a short or imperfect kick. "The flying leap," properly so called, is that taken at a gallop, nothing further being required to produce it than to elevate the head and throw extra spring into the stride, the impetus of the pace—which, if but moderate and the horse fresh, he much augments as he approaches the leap—being sufficient to take the animal over: it is the easiest and commonly the safest leap both for horse and rider. To shew the powers of leaping horses possess, some have been known to jump over bars or fences higher than themselves; and Nimrod—the late Mr. Apperley—relates an instance in which a hunter cleared seven yards of space*. Ponies, in general, for their size, are better leapers than large horses: this appears to arise from greater concentration of power combined with the less weight they have to move. Thorough-bred horses are seldom clever leapers; a circumstance owing, apparently, to their deficiency in rearing powers.

* I saw an account the other day in the "Sporting Magazine" of a horse in a steeple-chase making "a jump of twenty-two feet."

LECTURE XI.

PROGRESSION.

Locomotion implies vaguely the act or power of moving from place to place, and is equally applicable to animals with and without feet; PROGRESSION carries in its meaning the notion of feet, and signifies *stepping forward*: RETRO-GRESSION being its antagonist term—the word we use for *stepping backward*.

From the bare facts of quadrupeds being known to be the fleetest of the creatures that move upon the earth's surface, those that are capable of the greatest feats of saltation, as well as of the greatest speed and endurance in the course, we might safely infer that four legs constituted a number better calculated for progression than any other. Men can run and jump with, considering they have but two legs, surprising effect; but neither in the act of progression nor in that of saltation can they compete with certain quadrupeds; neither are many-footed creatures—*centipedes*, as some of them are denominated—to be compared in these respects with quadrupeds, or even, indeed, with bipeds: the number *four* appearing, in relation to legs, to be that which most happily answers the purposes of succession in stepping and propulsion, as well as for that continual shifting of the centre of gravity which necessarily takes place in the transportation of the body.

THE CENTRE OF GRAVITY, in a quadruped standing with its legs in their natural position, will be found to fall *anterior* to a point equidistant from each of the four feet, owing to the preponderance forward of the head and neck: the precise point upon which the line of gravitation will fall, it will be difficult or impossible to determine, that in some inconsiderable degree continually varying from the circumstance of the perpetual changes in the erection and declination of the head and neck, not to notice the unimportant fluctuations that may be caused in it by the movements of respiration and by the constant shifting of place of the viscera. The line of gravitation will be liable, however, to undergo variations of some consequence from the imposition of weight upon the animal's back, and these will be found to be of a nature correspondent with the situation of the weight imposed, its bulk or

amount, stability, &c. Some professional *confrères* of ours on the other side of the water, with that indefatigable spirit of curious inquiry for which they are on occasions so much to be lauded, have been at the pains to ascertain the degrees of these changes, and the manner in which they are affected, both in respect to the animal itself and to its rider.

Messieurs Morris and Baucher*, desirous of ascertaining correctly the influence of the head and neck on the distribution of the weight of the horse upon his four legs, especially upon the fore and hind legs, as pairs, had horses weighed in scales, constructed some years ago at the Custom-house for that especial purpose.

The first placed upon the balance was a hackney-mare, with saddle and bridle on, well enough shaped, except that she was rather heavy before. She was found to weigh in her fore-hand 210 *kilogrammes*†, in her hind 174, total 384, difference in favour of the fore-hand 36; there being, during the weighing, a fluctuation between three and five *kilogrammes* arising from the respiratory and visceral movements. The head was now forced down, until the muzzle came to a level with the chest: this made a difference of eight kilogrammes additional on the fore-hand. Elevation of the head, until the muzzle rose as high as the withers, caused a transfer of ten *kilogrammes* from the fore to hind quarters. The head being released, was next reined in and upward rather: this occasioned a rejection of eight *kil.* on the hind quarters. From these results we may deduce the conclusion, that the more the head is elevated, either naturally or by the hand, the more its weight and that of the neck is equally distributed upon the limbs, without any thing forced in the position.

After these experiments, M. Baucher mounted the mare: the weights then stood—fore-hand 251 *kil.*, hind 197, total 448, difference 54. The horseman being placed in an academical position, had his weight, which was 64 *kil.*, distributed thus: 41 *kil.* upon the fore-hand, and 23 upon the hind. Throwing the body backward occasioned a transfer of 10 *kil.* from fore to hindward; then gathering up his reins, he caused a further addition of 8 *kil.*,

* Extracted from the *Journal de Haras, Juin* 1835, into Lecoq's l'Exterieur du Cheval.

† A *kilogramme* is about $2\frac{3}{4}$ lbs. troy.

making a total of 18. When he stood up in his stirrups, the fore-hand received an addition of 12 *kil.*

These gentlemen with justice observe, in concluding this account of their interesting experiments, that "although the differences caused by the position of the head and neck of the animal, and of his rider, may not, under ordinary circumstances, be of any great deal of consequence, yet do they acquire vast importance in the course of work, such as racing or hunting, the preponderance increasing enormously along with the fatigue."

From these experiments we learn, that although the fore-hand at all times has more weight to sustain than the hind, yet, in consequence of the hind supporting more than its half of the trunk, does this additional burthen not amount to what the head and neck abstractedly would weigh; and we learn farther the important fact, that a weight upon the fore-legs, which, in the ordinary or natural position of the head and neck, amounts to 210 *kilogrammes*, becomes, by reining-up, reduced to 200, and that, with the rider on the back, a weight forward of 254 *kilogrammes* can be diminished, by bringing the head with the bridle-hand into the proper (*managed*) position, to 233, making a difference of 21 *kilogrammes*, or nearly 58lbs. troy. These are results which we, as veterinarians, shall be able to turn to useful account: to the equestrian and riding-master they are full of the greatest interest.

The limbs in the natural standing posture, placed as they are in parallels with the line through the centre of gravity, and being in themselves respectively so many co-operating centres of gravity, and bearing each of them its due proportion of the weight of the body, can none of them be moved in any material degree out of the lines of gravity—which we may suppose to run through their respective centres –without imposing additional weight upon their fellows, on account of placing themselves in a position disadvantageous for supporting the superincumbent load, and consequently creating some feeling of uneasiness, in time increasing to pain. The first act in progression is the result of the stimulus of the will: the brain gives the order through the nerves for the body to be moved forward; one leg moves, the other, through impulse, follows: the uneasiness created in the frame by the elevation and projecture of one limb generating that

impulse. No sooner is the centre of gravity of the body disturbed by the displacement of one of its supporters, than an effort is made to rectify the derangement; the rectification, however, is hardly accomplished before another act of disturbance is commenced: thus, by repeated acts of projecture in the fore limbs, and as repeated acts of propulsion in the hind, is the animal machine moved forwards at rates correspondent with the impetus generated by these movements.

When once set in motion, like the wheels of a carriage, the limbs instinctively continue in similar action or pace until some fresh mandate is received by them from the sensorium, that becoming the signal for some change in the action or pace. The rate the animal is moving at is either augmented or diminished, or his movements are altogether arrested, at his own will and pleasure. And though his master, as his rider or driver, may assume the control over them during the animal's working hours, yet could neither rider nor driver effect any thing without the assent of the animal himself; and it is ever a great deal best to obtain this assent through kind and conciliatory treatment than to extort it through ill usage.

Plain and evident as the movements of the quadruped may appear to the common observer, passing as they do every day under his immediate observation, yet have they furnished a theme for difference of opinion, not less in former days than in our own. Borelli, who commences his chapter *De Incessu Quadrupedum* with the remarkable words, "Egregiè in hac parte allucinantur, nedum vulgares homines, sed etiam præclari philosophi et anatomici; qui potiùs falsæ opinioni per manus traditæ, quàm propriis oculis fidem præstare volunt," is the first to fall into error. The movements of the biped are simple and self-evident; they consist of the alternate advance of the legs, and of the reciprocal shifting of the centre of gravity from one to the other: here there can be no dispute about priority or order of movement. When we have four in place of two legs, however, the case becomes materially altered. It is an easy matter to watch two legs; but it is difficult, nay, in quick movements impossible, to keep the eyes so fixed upon the motions of four as to say in what order of succession they are actually moving or treading the ground. In order,

however, that we may come at that through inference which we cannot derive from actual observation, we will commence with an examination of the slowest movement of all—the walk—and from that proceed to those next quick in succession, the slow or dwelling trot, the hand-canter or slow gallop; and, as we proceed, consider the changes, if any, that take place under augmentation of speed in these respective paces.

Notwithstanding Borelli's prefatory denunciation of the philosophers and anatomists of his own day, for pinning their faith on others' sleeves rather than look with their own eyes, he himself, as I said before, appears in error even in his very first observation. After shewing the parallelogramical figure of which the horse's legs, as they stand in their natural position, form the four respective angles, and that the centre of gravity falls near the centre of the parallelogram—though, according to his plate, placed *behind* that centre instead of before—he tells us the animal makes his first movement with a *hind* foot, "Incipit gressus ab uno pede *postico*;" and assigns as the reason for this, the necessity of establishing a new centre of gravity in advance prior to the movement of progression taking place.

Solleysell knew better than this; he had looked for himself, and not pinned his faith on tradition:—"In a walk," says this true observer of Nature, "the horse lifts the near fore leg and far hind leg *together!* and has them in the air at the same time; and when he sets these down he lifts the other two, which were cross upon the ground; viz. his far fore leg and near hind leg, and so alternately each remove. This is the true motion of a horse's legs upon a walk; which is the same with that of the trot, although the paces are different." Sir Wm. Hope, the translator of Solleysell's invaluable work, "The Compleat Horseman," appends to this passage a comment, in which he says, "Our author is here in a little mistake about the motion of a horse's legs in the walk," and by way of proving the error, refers to his "Supplement of Horsemanship" appended to the translation; where he again agitates the question, finding the same fault with the Duke of Newcastle as he had before done with Solleysell, and in great confidence lays down the law, that "the true motion of a horse's legs upon his walk, according to my own observation, which upon tryal will be found

to be as true as it is new, is *one, two, three, four,* as followeth. The horse, when he beginneth his walk, must either lead with the legs on the right side, or with those of the left: if he lead with those of the right, then the first foot he lifteth is his far *hind* foot, which maketh one, &c." Now, as far as my observation has gone, every horse—I believe I might say every quadruped—usually makes his first step with a *fore,* not with a *hind* foot. I have certainly remarked horses and cattle at pasture, who, with their legs in the parallelogramical or natural position, have, on occasions, moved a hind instead of a fore leg first, in the act of advancing foot by foot, as quadrupeds do while grazing; but I have rarely or never been able to detect the same thing when horses are about setting off in earnest to walk or to trot: it is not at all unlikely but that Borelli might have made his observation on cattle pasturing, though at such a time their movements can hardly be regarded as those of ordinary progression. At the mandate of the will to move forward the fore leg is first put in motion, the order of succession of movement in the walk appearing to be this:—supposing the off or right fore leg to move first, that is no sooner carried off the ground than the left or near hind foot is raised, the former being placed upon the ground again prior to the latter. The two remaining feet move, in respect to each other, in the same order of time, the left or near fore after the off hind, the right or off hind after the near fore; it being observable that, as each hind foot follows in the line of movement of its corresponding fore foot, the latter would very often get struck by the former did it not quit its place immediately prior to the other being placed upon, partly or entirely, the same ground. Now, as the off fore foot gets grounded before the near hind, and as the near fore foot is raised off the ground at the moment the near hind is placed upon it, it follows that the fore feet are performing in manner very or quite similar to the action of a biped, one being off the ground while the other is on, one being in advance while the other is left behind; the hind feet also are performing the same alternate movements, the only difference being that the motions are reversed: in fact, if we imagine two soldiers marching in file, or one behind the other, *out of step,* we shall have a very good idea of the movements of the quadruped animal: the soldier in front representing the fore legs, it is evident

that unless he gets his feet out of the line of march in proper time, they must be trodden upon by the soldier behind, representing the hind limbs; so that, in point of reality, the quadruped, in his ordinary movements, may be said to represent *a double biped marching out of step.*

With a view of rendering the order of movement of the four limbs of the quadruped more intelligible, it has been common with writers on the subject to note each foot by a letter or number: thus, the fore legs are represented by the letters A, B, the hind by C, D: supposing the A and C to denote the left or near legs, and B, D, the right or off, fore and hind respectively, and that A moves first, D will follow, and B will quit its place just in time for D to occupy it, while A will move off for a second time, just in time for C, the last leg to move, to take the ground A stood upon; up to which period A has moved twice to C's once. Supposing a hind leg, C, moved first, the fore leg, B, having to move next, A would not quit its ground in time for C to occupy it. When it happens that a hind leg does make the first step—as in horses or cattle grazing or moving leisurely or heedlessly—the step proves to be one short of the spot upon which the corresponding fore foot is resting, and so the latter is saved from being trodden upon. In this manner it happens that the fore and hind feet of the corresponding sides become, instead of being in respect of one another diagonally placed, approached close together on one side, standing under the centre of gravity, while on the other side the fore is advanced, the hind being extended backwards. This is not a natural position, but it is one that observably occurs in movements such as I have been describing, and likewise in those that, through any disturbance or derangement in action, are rendered irregular or discordant—as, when in the gallop, the fore and hind legs of opposite sides are in advance. So far as respects the common paces of walking and trotting, this appears to be the analysis of progression, the priority and order of motion of the animal's four legs: acceleration of movement, so long as the same paces be preserved, will not alter this order of succession, though it may quicken it to that degree that time is not given for one foot to reach the ground before the other is lifted off, and the conse-

quence is, that two, three, and even all four feet may possibly be in the air at one and the same time. In the ordinary walk of the horse, two feet are in the air at once, though they are not grounded simultaneously; there being, as Sir W. Hope has well described it, a pretty regular beat in the time of lifting and grounding the feet, in a true or good walk of *one, two, three, four*. Both fore feet and both hind feet moving, in respect to each other, alternately, it follows that no sooner is one fore foot lifted up than a hind foot is put in its place, and that these successions are in regular alternation, if we except the very first step the animal takes with his fore foot; that not being followed up by the hind one of the same side until the remaining two feet have removed.

Richard Lawrence, often an elegant, but not always a practical writer, though he inclines to Borelli's notion of the hind leg being the first set in motion, nevertheless commences his description of the horse's "walk" by the advancement of one *fore* leg, and that being placed on the ground—"*this action being completed*, the off hind leg is elevated and advanced," &c. It must be a very slow walk indeed—such a walk as a horse takes while he is grazing or seeking after food, or as when he most painfully or reluctantly follows the man leading him—that allows the setting down or completion of action of the fore leg before the hind one is lifted. It is quite erroneous to imagine that, "during the walk, the animal is always supported by a triangular position of three legs; namely, two fore legs and one hind, or one fore and two hind legs, alternately." Progression would be tardy indeed conducted upon such a principle as this, neither would there be that spring or lift in the walk which is requisite to constitute a good or a fast one. But *two* feet rest upon the ground in the ordinary walk; and however instable this may render the centre of gravity, the intervals are so short between the alternate transfers of gravity from the two feet quitting the ground to the two coming upon it, that all instability is lost in the impetus of progression. Were the fore foot set down before the hind was raised, the step could not be prolonged beyond the abstract extension of the fore limb; whereas, by the hind one of the opposite side being in the air as well, while the hind of the same side is grounded in advance, by the lever of

Second Art

the latter a propulsion is given to the body which throws the fore foot in air to a point farther forward than of itself it could have attained.

Restricting our observation to a single limb, three motions are evident in progression: by the first motion the limb is flexed, and the foot lifted off the ground; by the second, a sort of sweep or segment of a circle is described by the foot in the air; by the third, the foot is replaced upon the ground. The French, who have paid more attention to this subject than ourselves, have—after the "inventor" of them, Solleysell—designated these three motions by the apposite terms, *le lever*, *le soutien*, et *l'appui*, which we may render in English by, *the lift*, *the stay*, and *the rest*. The slower the pace the more distinctly these motions are seen. In no pace are they better demonstrable than in what is called "a good walk;" the animal then, with a flexion of the leg, sharply catches his foot off the ground, subsequently making a sweep with it upward and forward, and lastly plants it firmly and flatly down again. Insufficient lifting gives no room for the sweep, and insufficient sweep occasions the toe to strike against the ground before the foot has revolved into a position proper to be placed down; and the consequence is, from the weight alighting upon the toe instead of upon the foot flatly planted, knuckling over, and stumbling, and now and then falling. The quicker the pace, of course, the quicker these motions are performed. In the walk they are distinguishable enough, each limb taking its regular turn in them. In the trot this is likewise the case, until the speed comes to be augmented to that degree that three and even four feet are off the ground at once, and then, though the motions still have to be performed by each limb in succession, subject to interruption from incidental circumstances, they are apt at times to be irregular.

The lift, or raising of the foot from the ground into the air, may be faulty from naturally defective action; from a habit of careless going; from lameness; and from any one of these causes a horse may stumble, and prove unsafe to ride. Without, as many writers on this subject have done, endeavouring to shew in what manner or by what rule a horse, in a walk or a trot, should take up his foot and put it down again, or what particular sort of

action his walk or trot should consist of, I shall deem here it sufficient for all practical purposes that he is *safe* upon his feet in his paces, and manifests sufficient speed in them to escape the denunciation of being "slow." A horse may lift up and set down his feet with mathematical precision and admirable beauty, as, in some persons' estimation, most of the foreign horses do, and yet prove insecure upon his legs, or he may go close enough almost to kick up seven-shilling pieces, and yet prove a safe hackney, of which I very well remember an instance in a mare, a cover hack, belonging to Capt. P., who, notwithstanding she appeared to raise her feet hardly oyster-shell height from the surface, dashed along at a good ten-mile-an-hour trot, without—as the Captain has often assured me—ever making a mistake. I do not make mention of these acknowledged exceptions to general laws that have been laid down by writers on action, with a view of casting any disparagement on them, but to shew that horses will go well and safely in many ways different from those prescribed for them, and in so many different modes, that, to set about to frame rules for action, to say a walk should be performed in this manner, and a trot in that manner, is more, I think, than any man who had in his time ridden many horses would pretend to do. Even Solleysell, who may be regarded as the original framer of these rules, after telling us how a horse should raise his foot, "so as not to cross one leg over the other," and how he should *sustain* his limb, so as properly to poise his body, and how he should put it flat down, "the whole foot equally at one and the same instant of time," admits, still, that "there are some horses which, although they have the raising, keeping up, and tread of the foot very good, *yet have they a bad walk.*"

LECTURE XII.

THE PACES.

Lexicographers derive our English word *pace* from the French *pas*, which we translate *step*: the French making use of the word *allure* for pace, a derivative from *aller*, and literally signifying *going* or *gait*. Pace with us has a double signification: it may mean either a horse's *mode* of going, or the *rate* at which he moves. When we say a horse's paces are good, we leave it doubtful whether we mean that his *action* is good, or his *speed* is good, or that *both* are so; but when we say a horse has but *two* paces, it is very well understood that he is wanting either in his walk or trot or gallop; and this last is the sense in which we use the word *pace* here.

In a state of nature the horse is said to have but three paces or different actions or modes of going—*walk*, *trot*, and *gallop*, all others being viewed as *artificial*, in contradistinction to these three, which are called his *natural paces*: the *canter*, the *amble*, and any other pace a horse may be taught to go, consequently, come into the latter class. This division, however, is not quite in accordance with truth. Though we may admit the amble to be altogether an artificial pace, assuredly we have all occasionally seen foals cantering after their dams. Therefore, the canter must be in part natural, at least, strictly speaking, can be regarded only so far as artificial that it is not, like the others, always to be observed in the natural state, or that horses are to be found that never *naturally* canter, or who are exceedingly difficult to be made to canter, and with every pains that can be taken with them, can never be made to do so with any degree of grace or perfection. Notwithstanding these objections, however, we deem it more consonant with observation and practice to regard the canter as an artificial pace.

Let us first consider

THE WALK.

The walk is the pace the quadruped, by nature or habit, breaks into out of a state of inaction or quiescence. It is the slowest of the paces—that by which all the others are more or less influenced, and so might with reason be emphatically denominated the *primitive* or *cardinal pace*. The best earnest a horse can give us of "what he can do" in other respects, is his walk; a clever walker will perform well in his trot, and most likely in his gallop likewise: indeed, I have heard eminent turf-men say, it is rarely that a good racer is a bad walker. A horse so made that walking is either difficult or impossible of performance to him, without perpetual blundering and danger of falling, may gallop or canter to satisfaction, but cannot be expected to be a good trotter, the walk and the trot being paces requiring similar conformation and powers of progression. There are some people who will not look at a horse (for purchase) that cannot walk. For a hackney, park or pleasure horse, charger, and, above all, for a lady's horse, good walking is indispensable; for a hunter it is next to indispensable; and in a racer highly desirable. By *good walking* I mean the *powers* or *capabilities* of walking well: a horse not in possession of that form and action that enables him to step properly or safely in his walk I call a bad walker; and not one who has been caused to walk improperly or amiss, either through any mismanagement in the training or using of him, or any anormal condition into which he may have been thrown by accident or disease: the epithets *good* and *bad* have, in fact, reference here to natural or original disqualification, and not to any thing incidental or superadded.

The physical properties foreshewing a horse to be a good walker must be collected principally from what has been already said about form, in particular of the fore legs and shoulders; at the same time the hind limbs must not be overlooked, they, with the fore, concurring to make the good walker. We may often, when we behold certain anormal or ill construction of the limbs, without hesitation pronounce it impossible that such a horse can walk well; though we are liable to be deceived in our opinion about the

pace being properly executed when we see form that we cannot help admiring. It would be, indeed, a perfection in this branch of our art, could we deduce action from form: although we may venture to decry what cannot fail to perform ill, we cannot always predict what will act well; and one reason why we cannot is found in the circumstance of the physical powers requiring a *savoir-faire*, which, being derived from vitality, is without the pale of our calculation. Notwithstanding, we shall always do well to "observe," with Solleysell, before a horse is put in motion, "if he be right planted upon his limbs; because upon the right or wrong posturing* of a horse, when he is standing still, doth depend, not wholly, but in part, his good or bad going and carriage." In other words, a horse *naturally*—and not by trick or art shewn—standing *well*, is not likely to perform *ill*.

We now come to the question, what constitutes *good walking?* "For a horse to walk well," says our excellent authority, old and venerable Solleysell, "his steps should be quick"—he should "make two steps with his feet in the space that many horses make one."—"The four adverbs, LIGHTLY, SURELY, QUICKLY, EASILY, express all the most nice and curious can desire in a horse's walk." In this quaint description how much truth and nature sparkle forth! What reader that does not in it discover the lightsome, nimble, nodding hackney, catching up his foot, quickly and gracefully twirling it in the air, and afterwards putting it fairly, flatly, and firmly down upon the ground; "beating," as Adams† says, with his feet as he goes along, "one, two, three, four," and with that regularity and decidedness that to the ear of the experienced horseman they tell "a music" he alone knows the sound of. Every man conversant with horses recognizes *this walk of the hackney* the moment he beholds it—there is no mistaking it; and the same as soon discovers the indifferent or *bad walker*.

* In the translation of Solleysell's work by Sir W. Hope, this (which in the original French is *camper*) is rendered camping: an un-English expression, and one that means—if it means any thing—the stretching out of a horse as in the act of staling. The signification of the author here, is the *posture* or *position* which a horse, *left to himself*, will assume; and not any he may be thrown into through the art of the dealer or the cunning of the groom.

† Analysis of Horsemanship.

It is easier to point out defects in a horse's walking than to define in what good or proper walking should consist—like many other things, we know it when we see it, but we hardly know how to describe it. Good walking will be found one thing in the cart-horse, another thing in the hackney or hunter, and a third thing in the race-horse; and no one or single description will apply to the walks of all three breeds or kinds of horses. Again, foreign horses—Arabians, Spaniards, Dongolas, &c. walk in quite a different style from British horses. There is a variation in the walk even beyond this. Two hackneys or riding horses will not walk alike, though both may be acknowledged to walk well: one will have the true hackney action, the sharp or quick *lift*, the graceful turn in the *stay*, and the flat and firm *grounding* of the foot, which we all so much admire, and which by writers in general on this subject is described as *the proper manner in which a horse should walk*, as though there were no other; while the other hackney — displaying perhaps more breeding — will, race-horse like, lift more leisurely, and, instead of twirling his foot, will cast it pointedly forward in a horizontal line, and place it daintily upon the ground, as if he took every pains to do so with precision; and withal will step, perhaps, with perfect safety, and advance as fast as the quick-actioned hackney. Supposing, therefore, we assume good walking to consist in speed and safety, adding thereto even elegance or gracefulness, there are manifestly *two*, if not more, ways of accomplishing it; and these two, being so different, are sufficient to set at defiance any single rule we may lay down for its performance, or any single definition we may give of it. So that a horse's walk be neither slow nor unsafe, nor (to the rider) uneasy, we shall not widely err in regarding it as *good*, let it be performed in whatsoever manner it may. However fast it may be, if insecure, it is seriously faulty; and though fast and safe, still, if rough or unpleasant to the rider, it is objectionable. In fine, the walk of a horse should be estimated rather by its effects and products than by the manner or method in which the animal performs it.

FAULTY OR DEFECTIVE WALKING may proceed from various causes. It may be *natural* or *acquired*. A horse may be so formed that all the pains in the world cannot make him walk pro-

perly or well; and the best walker may be rendered otherwise by mismanagement, or from unsoundness, or age. That man will act wisely who refuses to purchase or to have any thing to do with the natural bad walker: if he cannot walk well, he cannot trot well, and will most likely prove insecure in one or both paces; and though by a judicious system of *manège* he may and will probably turn out susceptible of improvement, still he will, as I said before, by no pains be convertible into a good or safe walker and trotter; and, therefore, the best counsel I can give a man who wants a horse for riding purposes is, I repeat, to refuse the purchase of *the natural bad walker*. But good walking may be destroyed or converted into bad walking by injudicious training or riding. It is surprising what a difference—a difference known only to horsemen—proper and improper riding makes, even in horses that are by nature excellent walkers. I have often heard my father—who was a good horseman—say, he could tell when another man had been riding his horse from the difference he felt (the next time he rode, himself) in his horse's walking: the hand and the leg have so much to do in inciting the walk, while they restrain the shuffle, and prevent any attempt at a trot. Such a horse, bad or no walker from habit, will shew no natural deformity: his make will be that calculated to produce good walking, and he will perform faultlessly in his trot, and most likely in his gallop as well; all which will go to shew that his walking pace is bad through mismanagement, and not from natural incapacity. His walking, however, may not be destroyed; it may, by the method of riding, be but altered. From being a free and far stepper he becomes a short stepper, dwelling upon his steps in consequence of being reined in, prolonging his *stays*, and thus, altogether, altered in his walking action from what he originally was, affording an example of what may be accomplished through difference of riding. Foreign-bred horses step short by nature; nor is it possible, I believe, through any system of *manège*, to make them step *à l'Angloise:* they manifest a good deal of action in *lift*—throw their legs about much—have a longer *stay* than our horses, and put down their feet too little in advance of the spots from which they were lifted to make much progress. Again; stepping short, either by nature or from habit, must be distinguished from the short, tender, or cramped step of

the horse that has been for any length of time in a state of disuse, or standing in the stable without exercise, as well as from that of the foundered or groggy horse. In cases where any doubt exists in the mind of the examiner, whether the short-stepping walk proceed from one cause or the other, a trot will commonly dispel it, and exhibit the case in its veritable light.

THE LIFT of the foot in walking may be insufficient, or it may be greater than is required for the purpose of progression. In the former case, the horse will be likely to hit his toe against any stone or prominence in his way, occasioning him to stumble; and through the effort he makes with the opposite fore leg to save himself, will run great risk of again faltering and falling; the foot coming to the rescue of the other, not perhaps prepared to come flatly down, descending upon its toe, upon which the imposition of weight is sure to cause knuckling over, and so down inevitably the horse must come. But there may be too much lift—over much action in the air: the animal may in his walk even, and more still in his trot, throw his legs about, cross them probably, in that manner that he makes but short advances in progression, being after all but a *slow* walker, and moreover is extremely likely to strike one leg with the opposite foot, either at the fetlock or beneath the knee, the latter being what is called *speedy-cut*. Independently however of the liability to strike, it by no means follows, because a horse has high or free action in his walk, *ergo*, that he is a safe walker. Some of the foreign horses are any thing but secure steppers; they drop and suddenly fall down upon their knees, and, I believe, from weakness in those joints. Neither does it follow that horses that go near the ground, *daisy-cutters* as they are often called, are of necessity unsafe walkers—many instances occur proving the contrary*. The lift of the foot, in good walking, should be sufficient to clear all ordinary obstacles in the road, and the action should be *collected*, within the sphere of the animal's perfect control, and not *sprawling;* and the foot should be flexed in the air without any great deviation laterally out of the line of direction, forward and backward, turning the toes either much out or much in—though the latter is less objectionable than the former—being

* One will be found mentioned in a preceding lecture.

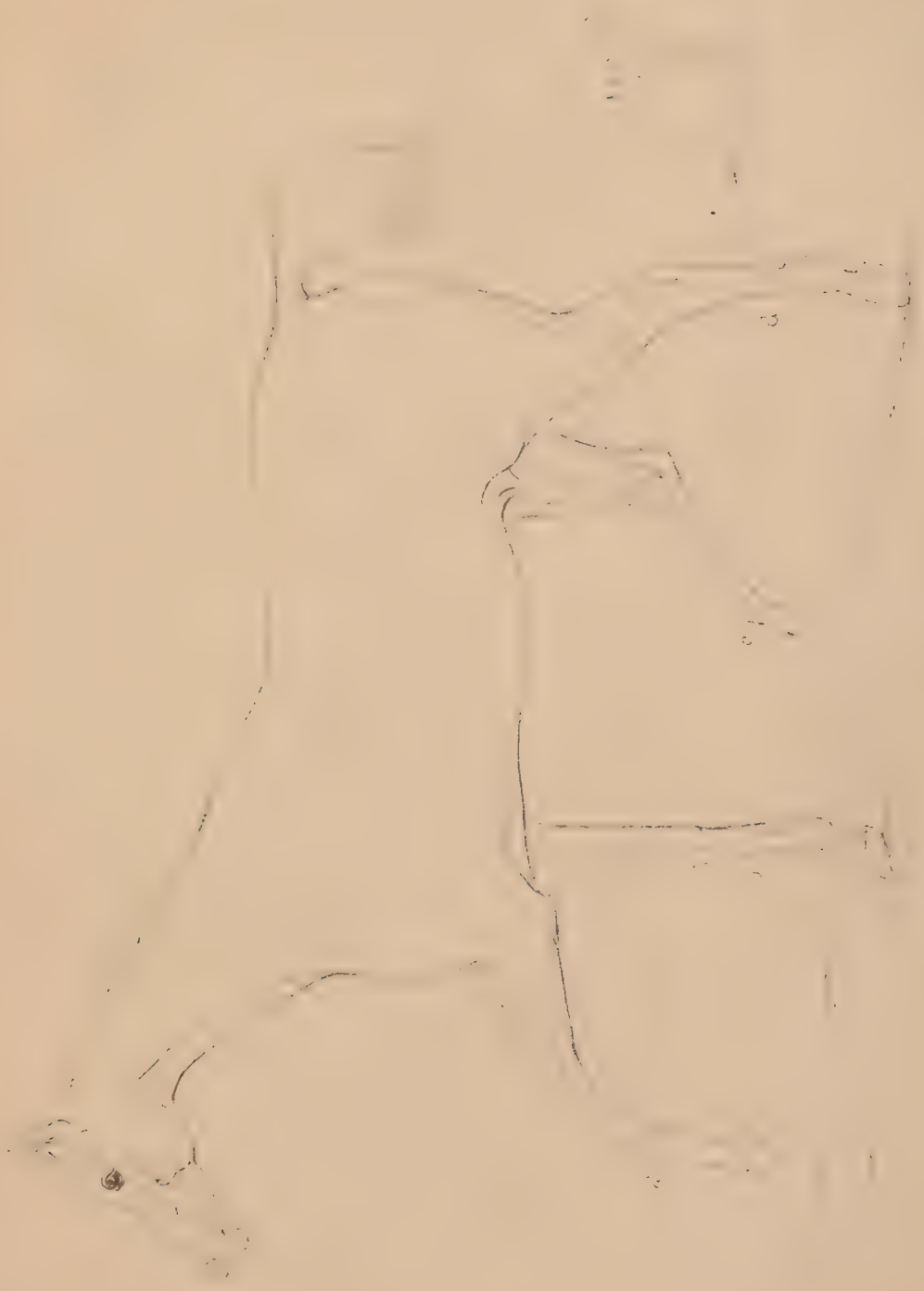
both faulty in action. And a horse that flexes his foot well in the lift, exhibits his shoe during the eversion of the foot, and that has a nimble though short step, though he may not make more ground or even so much as a horse with straight action, will be a much pleasanter hackney: in fact, this is the action that has already been described as, *par excellence*, the hackney action.

THE GROUNDING of the foot should be flat and firm. To the eye of the observer there is the slightest perceptible difference between the toe and heels coming to the ground, in favour of the former; a difference that need not disturb the horseman's good old rule, that *a horse in his walk should place his foot fairly and flatly down.* Alighting upon the toe, as some horses with high and round action are apt to do, renders the step instable until the heel comes to the ground; or, should the superincumbent weight preponderate forwards, then knuckling over is the result, and an awful drop, or else a fall, the consequence. Horses that go upon their toes have, for the most part, strong upright feet, with concave soles; whereas, such as have flat feet are more likely to go upon their heels, to save their weak crusts. We have an illustration of this in the going of lame horses: such as are lame from contraction or navicular disease, feeling the pain or tenderness in their heels, tread upon their toes; and such as feel the pain in their toes or crusts, horses that have or have had fever in their feet, do all they can to step upon their heels. It is curious to observe—and one way in which we may do so is by the wear of their shoes—how different the tread of horses is: at the same time, we must bear in mind that the wear of the shoe not only tells how the horse treads, but also, in some measure, the manner in which he takes his foot off the ground.

THE RATE OF WALKING in a horse is faster than in a man. Fair toe-and-heel walking at the rate of four miles an hour, in a man, is accounted a good pace: a horse we reckon ought—to do well—to walk five miles an hour; the ratio between the two appearing to be about as 5 to 4. But how would these relative differences stand, came they to be multiplied? Would a horse walk a hundred and twenty-five miles while a man was walking a hundred?

THE TROT.

Trot—a modification of our word *tread*—denotes in equitation the pace ranking in order, in point of speed, between a walk and a gallop; neither slow like the one, nor swift like the other. Although the limbs in the trot, in reference to the fore and hind of the same side, have the same contrary or diagonal motion that they have in the walk, i. e. the off fore and near hind, and near fore and off hind, are both in action, as well as at rest, at the same intervals of time, yet is the trot not an accelerated walk, but a distinct pace by itself, as may be proved both by the animal's manner of going, as well as by an analysis of the two paces. We have already seen that, in the walk, although two limbs are in motion at one time, yet do the four succeed one another, in being lifted and grounded, in some such regular manner as may be represented to the mind by counting aloud, one, two, three, four. Not so, however, with the trot. No sooner are the limbs put into quick motion than the time is found too short for them to play to this fourfold step, and the consequence is, instead of reckoning four, we can hear but two beats; those of the contrary fore and hind feet being synchronous. This will account for the spring or elasticity of movement of the trotting horse; as well as for the rough action of the *runner*—as the horse is called who trots after the manner of walking, instead of possessing the synchronous diagonal movement, and who, as is well known, is commonly a *bone-setter*. In this latter kind of trot, springless and uneasy though it be to the rider, regularity or harmony in the motions of the limbs is still preserved; whereas in the jumble—*trot* can it be called?—of trotting before and galloping behind, and in what John Lawrence significantly terms *hitching*, there is evident discrepancy in the movements, produced by overstrained efforts to accomplish that which the powers or capabilities of the animal are inadequate to. And this is the jumble of a pace—this the confusion of trot and gallop—butchers' boys and cads, *et hoc omne genus* (who in riding or driving are saving time by minutes, whilst in lounging or doing worse they are squandering it by hours), urge their horses



perseverance on the part of their riders, get a knack of it; others there are that cannot by any means, harsh or mild, be made to perform it; but in the effort are driven either into the butcher's *hitch* or into the jumble of trotting before and galloping behind. Lecoq calls such horses *foibles*, weak; and it is not unlikely some of them are so, either from natural formation or in consequence of some inflexibility of the loins or hocks, &c. We are far from being able, however, at all times to say to what the incapacity is owing.

Having considered the *order* of movement of the limbs in the trot, and made some allusion to the intervals of time consumed in grounding the feet and in making the necessary revolutions with them in the air, we come now to look at the relative positions they occupy in action, and see how it happens that they do not interfere one with another. In the slow or ordinary trot, the hind limbs are so carried underneath the body that their foot-marks fall near about those made by the corresponding fore feet: the fore foot has no sooner left its place of implantation than the hind foot occupies it. In the walk, the hind feet ordinarily in part cover the prints of the fore: as soon as the animal strikes into a trot, they quite cover these prints; and as the speed increases their relative advance gradually becomes greater, until the hind overstep the fore feet, and would and must tread upon them, were it not that the former were advancing in different lines of direction from those in which the latter are stepping. Mostly, these lines are within the other; the hind feet of a well-going horse treading (by turns) quite under the middle line of the body—that line along which the centre of gravity moves—and in this manner avoids collision with the fore feet: in some instances, however—in horses that "go wide behind"—the hind feet are planted to the outer sides of the fore ones, and thus equally advance clear of them. There are instances or occasions where they take the same line of progression with the fore feet, and then collision is the inevitable consequence—*overreach* as we term it. This, however, is a rare occurrence, save when the horse is thrown out of his natural action or forced beyond his ordinary effort by the injudicious or inhuman conduct of his rider or driver.

I have shewn, in another place, that strength and flexibility of

loin have much to do with speedy progression. According to the observations of Vincent and Goiffon*, the spine of the back grows incurvated during rapid trotting, the effect of which is to open the shoulders, causing them to spread farther apart in action, and thus to give more room for the play of the hind feet through the interval between the fore feet. In ordinary trotting, these gentlemen say this does not happen; and hence they account for the re-action felt by the rider, through the back, in one case and not in the other.

THE TROT is accounted, *par excellence*, the pace in which the British horse excels. Foreign horses, in general, are better adapted for the canter or the manege than for trotting, their trot being high and round, and therefore, in rapid going, necessarily very quick, and yet, with all their action and agility, they do not make progress—do not get over the ground—with any thing like the speed of an English trotter. The action of our trotting horse is that which *tells* in progression rather than makes any parade in gait; and yet this is not of any one peculiar kind, good trotters going, as our dealers say, "in more forms than one."

As was observed on a former occasion, a great deal may be learnt of what we are to expect in the trot by noting well the walk of the horse: if the slow pace be cleverly performed, we have good earnest for the creditable execution of the quick pace. We may even carry our observation farther than this: we may often tell the *manner* in which the horse will trot from paying attention to his mode of walking. Horses trot with *high* or *low* action, *round* or *straight*, *darting* or *dishing*, *ordinary* or *grand*, &c., depending upon the manner and energy with which they move their limbs. People in general, in estimating trotting action, are too apt to confine their observation to the fore limbs, forgetting that the hind are the propellers of the moving machine, and that upon them, after all, must mainly depend progression. While height and rotundity of action give beauty, straightness or projecture give progression; and a certain combination of both it is that constitutes what we are in the habit of so admiring as to call, by way of distinction, *a grand trotter*. Perhaps, in our country, hardly any better examples can be adduced of this perfection in trotting than the

* As stated by Lecoq., op. cit., p. 385.

royal stud furnishes: the Queen's (not the state) carriage-horses—horses standing from sixteen to eighteen hands in height—whose grandeur or beauty of action is exceeded only by the awful rate at which they get over their ground. Our late sovereign, George the Fourth, was celebrated for his noble coach-horses: their trot in the royal carriages was of the finest description, and he brought his teams to the highest possible degree of perfection by casting (for sale) every horse who was not able to keep pace with his more fortunate competitors. Of a trotting hackney a better epitome can hardly be given than that contained in the distich of the old song—

> "He was such a one to bend his knees,
> And tuck his haunches in*;"

the "tucking of the haunches in," as I remarked before, having a mighty deal to do with the pace. "The horse that points out his fore legs, and goes with his knee straight, is no trotter," says John Lawrence†; "he loses time by over-striding."

So far as we are able, from general observation, to say what is the fittest form or structure for a trotting horse, we may set it down as a rule having but few exceptions, that shortness of the shafts of the cylindrical bones of the limbs, and uprightness in the joints, are more conducive to the performance of this action than length and obliquity. Few race-horses can trot well, owing to the lengthiness of their limbs and springiness of their joints; and as for cart-bred horses, though they possess the requisite shortness of make, their comparatively broad and lax structure is, as I said before, calculated rather for strength than speed. In general, horses celebrated for feats of trotting are by no means pleasant hackneys: when put out at their speed, they use their limbs with that quickness that does not allow time for the operation of sufficient elasticity to amount to spring, and with that force which greatly tends to destroy elasticity; the consequence is, that many of our most famous trotters are what riding *connoisseurs* call "bone setters."

* I know not if I quote correctly. In truth, I have almost lost sight of the famous old ballad.

† Treatise on Horses, &c. 1810.

To conclude this lecture with some accounts of the feats of trotting horses, we cannot, that I know of, consult better authority on what has been performed in days gone by than John Lawrence, who appears, as well as being a sporting character himself, to have been at some pains to chronicle these performances. "The fastest trotter" which, this writer has good reason to suppose, "has ever been tried in England, was called ARCHER, from the name of the person who brought him to London." Mr. Lawrence could not conceive Archer's *rate* of trotting (for a short distance) "could be below *twenty-five miles an hour!*" A brown mare, the property of Bishop—a London dealer in horses—not so speedy as Archer, but of greater strength and endurance, is said to have been the first horse that ever trotted sixteen miles in one hour with twelve stone of burthen, and she performed the distance in fifty-eight minutes and some odd seconds. "In 1793, Crockett's grey mare trotted one hundred miles in twelve hours, and had twenty minutes to spare."—"In 1792, a yellow-bay gelding, called Spider," * * "trotted twenty-four miles in an hour and an half." And Mr. Lawrence's "own brown mare, known by the name of Betty Bloss," * * "trotted fifteen miles in one hour, carrying fourteen stone." Lastly, according to the same authority, "the brown mare Phenomena performed seventeen miles in less than fifty-three minutes, carrying a lad of five stone in weight; and her proprietor afterwards offered to match her to do nineteen, and after that nineteen and a half miles within the hour, both of which offers were declined.

In our own days the Americans appear to have carried off the palm for fast trotting. We learn from a newspaper called the SPIRIT OF THE TIMES, published at New York, and dated 29th July, 1843, that

In June 1841, a bay gelding, called CONFIDENCE, trotted in harness over the Beacon Course a mile in two minutes and thirty-five seconds, beating a horse called WASHINGTON.

In November 1842, DUTCHMAN, another bay gelding, performed the same distance in the same time, ridden, over the Hunting Park Course, beating the bay horse, RIFLE.

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and a half seconds; taking but half a second more to achieve the same on the following month. And over the same (the Beacon) Course, in May 1842, RIPTON, a brown gelding, trotted in harness two miles in the astonishing small space of time of five minutes and seven seconds!—the greatest feat of the kind, probably, on record.

THE GALLOP.

A horse by nature walks, trots, and gallops; and with these three paces his speed may be said to receive augmentations from the comparative slowness of the first until it arrives at the proverbial fleetness of the last: hence the word *gallop,* in a variety of figurative senses, is used to imply fast motion or great haste. Its literal meaning, as regards quadrupeds, is given in our dictionaries to be *moving forward by leaps;* and the animal in the act of galloping creates that motion in his body which certainly strikes the casual observer with the notion that he is making at the time a succession of jumps or leaps. Indeed, some equestrian writers have gone so far as to define the gallop of speed or racing gallop to be nothing more than a repetition of leaps. Mr. Blaine observes, that "as the two fore feet at once beat the ground together, and then the two hinder, so it is evident that the gallop of speed is nothing more than *a repetition of leaps.*" Lecoq likewise describes the *galop de course* as consisting in *une succession de sauts.* In the face, however, of these worthy authorities, I must say that, to me, the gallop and the leap appear acts of a different nature, and consequently that we are in error when we say that the one is no more than a compound or repetition of the other. In galloping a horse—in hunting for example—the rider needs no person to tell him of the moment his horse is taking a leap, however trifling it may be: his own sensations inform him of every *grip* or furrow his horse leaps in his course, and should he have occasion to make a succession of such jumps, the rider's sensations in his saddle are of a very different—very uneasy—kind, compared to such as he experiences during the act of galloping. This arises from two causes:—from the spring or movement of the body necessary to produce the leap being more forcible and sudden than that required for the gallop, and from the latter being created and con-

The Gallop

Pl. VI.

tinued rather by the successive action of the two hind feet at one moment, and of that of the two fore feet at the next moment, than by the synchronous efforts of either biped, as happens in the leap. The two great propellers of the animal machine—the hind feet—are in the leap required to act *simultaneously*, to make one grand propulsory effort: not so in the gallop, that being a movement requiring maintaining, not by synchronous exhausting efforts of the hind feet, but in swift succession, first by one then by the other; and the same as regards the office performed by the fore limbs; which latter probably amounts to little more in effect than the sustentation of the fore parts of the body.

The vault into the air required for the leap is only to be effected by extraordinary subitaneous effort; but the stride of the gallop, requiring frequent repetition, does not exact this effort—amounts, in fact, to no more than a sort of *lift* from the ground, multiplied into a reiteration of forcible heavings forward, maintaining, increasing, or diminishing the momentum of speed, effectuated by throwing the hind feet as far forward underneath the body as possible, plunging them one after the other with inappreciable rapidity into the earth, and thus by two strenuous thrusts against the ground, one in aid of the other, working the animal machine onward in its fleet—almost flying course. In the gallop as in the trot, no sooner is a certain momentum acquired than by each successive propulsion of the hind feet the body is sprung or lifted off the ground, flying, as it appears, in the air; and the greater the speed the more this volitation becomes apparent; hence the appellation given to the pace manifesting the utmost speed of FLYING GALLOP. Even this, however, according to my judgment, is an action different from leaping. When a horse leaps or jumps in his gallop—which he will do sometimes when he is *beany*, and has but just emerged out of his stable—he is said to *buck*, because his action then resembles that of the deer, in whom the gallop might with a great deal more propriety be called a succession of leaps: even the deer, however, cannot continue this bucking action after being driven into his speed or into a state of fatigue, shewing that in him it is to be regarded rather as a gambol than as his proper working onward action. And that the hind and fore feet, in pairs, are not grounded synchronously, I think, admits of demonstration in two ways:—

first, by the position they assume, one in advance of the other, in the gallop; secondly, by the clatter the steps of a horse in a gallop are known to make upon hard or resonant ground, and which may be heard either by a spectator or by the rider himself; whence we probably derive the phrase *a rattling gallop.*

In the WALK, we found the four limbs acting in such regular alternation, crosswise or diagonally, that they seemed to beat one, two, three, four. In the *trot,* we found this regularity of movement, in regard to *time,* interrupted and in part destroyed; the same *order* or succession of movement—the diagonal—being still preserved. In the gallop, however, both the time and order are inverted. The diagonal movement is no longer seen. Both fore limbs are projected together, one more or less in advance of the other; and their projecture is followed by the simultaneous advance of the hind limbs, the feet of the latter lodging upon the ground contiguous to the places just quitted by those of the former, with that hind foot foremost which corresponds to the fore foot that is leading. So that galloping differs (leaving the consideration of speed out of the question) from either walking or trotting, in the circumstance of the fore and hind feet being projected in pairs, and also in that of the fore and hind feet of the same side being generally in advance of their fellows.

With the fore leg which is projected in advance of its fellow, the horse is said in his canter or gallop *to lead:* commonly, more from the directions of art than from any propensity of nature, the *right* is the limb that takes the lead, it being by riding-masters and horsemen of judgment regarded as a fault to lead with the left leg. Whether natural inclination be for the right or for the left leg, I will not pretend to say; but this I know from experience, that it is an extremely tiresome task to make some horses lead with the right leg. There are very good equestrians, however, to whom it is quite a matter of indifference which is the leading leg, providing the horse canters or gallops *in a proper form.* The slower the pace the more conspicuously prominent, in general, is the leading limb: as the pace increases, this becomes less and less remarkable, until at length, at full speed, so even is the projecture of the limbs that it is difficult or impossible to say which is taking the lead. Where the opposite leg is leading behind to what is in

advance in front, the harmony of action being destroyed, so uneasy a seat is given to the rider, as well as a shake of that nature to the whole frame of the horse, that forbids, on the part of both, the discordance to be of long continuance.

The action of the limbs in pairs it is that renders it so difficult—nay, generably impossible—for a horse to strike at once into a gallop; most horses requiring some preparatory movement before they can work their limbs into the required action and speed. The momentum once gained, however, the machine by repeated strokes of the limbs is easily kept in motion. The knowledge of this fact constitutes the basis of the wager so commonly offered by connoisseurs, that a man shall run 50 yards before a horse can gallop 100. Were the race prolonged to 150 yards, the man would find he stood not the slightest chance of winning it.

French equestrians distinguish three kinds or gradations of gallop:—1. The ordinary or hunting gallop, or the gallop with three beats; 2. The manage gallop, or the gallop with four beats; 3. The racing gallop. The first and third of these accord with our own practical notions of the pace, but the second can mean no more than our *canter:* though where to draw the precise lines between the canter and what we call *the hand gallop,* and between the hand and the hunting gallop, or between the latter and the gallop of full speed, may prove more than any of us are able satisfactorily to do. There is, certainly, a wide difference between the paces of canter and gallop; but to say with precision where one ends and the other begins—whether the canter ought not to exceed six or seven miles in an hour, or whether it ought to amount, as others think, to eight or nine miles in the time, are points too knotty for me, as a veterinarian, to unravel. Neither is it easy to determine whether Lecoq be right or wrong in pronouncing there are but three instead of four beats to be heard in the ordinary gallop; though I hesitate not to think he is in error when he says, that the gallop of speed is a pace by itself in which the body is transported through *a succession of leaps.* Mr. Blaine, indeed, notwithstanding he pronounces the gallop of speed to consist in a repetition of leaps, refuses assent to the doctrine of "foreign manege masters," that "all the gallops are distinct paces. On the contrary," says he, "I think them all constructed of one

and the same action; of which a sufficient proof presents itself in the certainty that the horse can change from either of the gallops into the other without art, without alteration of his centre of motion or equipoise, or without interrupting the harmony of the moving members, but merely by an increased or diminished effort of the same action."

Lecoq presents us with an interesting analysis—a thing difficult in practice to obtain—of what he regards as the veritable, the ordinary gallop. In a complete stride or step, "the body is supported, 1st, upon one hind foot; 2dly, upon two diagonal feet; 3dly, upon one fore foot; 4thly, it is without support—in the air." "And this succession of tread is so conducted," adds Lecoq, "that the prints made by the two diagonal feet appear in advance of those of the opponent diagonal feet: the horse being said to gallop with the *right* or with the *left* leg, according as the right lateral biped or the left take the lead."

Barring the broad and obvious distinction there exists between the gallop and the canter, it is difficult, if not impracticable, as I said just now, to draw any lines of division in the gallop farther than as regards the rate at which the animal is going. At the same time we must all admit that the gallop, as we witness its performance by horses of different breeds and shapes, is a pace admitting of many variations from any standard of galloping action or rate of speed we may presume to set up. Lecoq's marks of distinction of four, three, and two beats, will not, I think, bear the scrutiny of practice; and even if they did, the performance of any of the gradations of the pace, from the canter to the gallop, will prove altogether different by the heavy or cart-horse from what it would by the light and active or thorough-bred horse. And again, of horses of the same breed, some are formed peculiarly well for galloping; whereas the make of others seems better adapted for trotting. The racing gallop is evidently so far a peculiar pace that no other description of horse can execute it with the same perfection as the race-horse. With the dart-like projecture of his limbs, lifted no more than sufficiently off the ground to go clear of obstacles; with his bending his back and loins, and lowering himself, and laying himself out at his full length along the ground; and with the vast strides and springs

forward he in this position is capable of making, he in fleetness excels almost every other animal, and far surpasses every fellow of his own kind, not thorough-bred, that can be brought against him. So far the race-horse—I might in pride say *the English racer*—is an animal veritably *sui generis*. Contrast the clumsy gallop of the cart-horse—if the pace as he performs it can be so called—with the airy skimming movement of the race-horse; nay, compare the high, round, or clambering gallop of the foreign horse, or that of many of our hacks, our trotters especially, with the racer's action, and how strikingly different are they found! All this will go to demonstrate the truth of what I have just asserted, that, so far as regard different horses, there are many and various kinds of gallops, though to class them or make any sort of useful arrangement or distribution of them is a task to which we, for the present at least, may find ourselves incompetent.

The circumstances of the cart-horse hardly being able to gallop at all, while the race-horse is evidently "made for galloping," may serve, on due consideration, to throw some light on that conformation of body and limb which is peculiarly characteristic of a good galloper. Length everywhere in the form of the body appears indispensable: length of neck, back, and loin; length of limb, of arms, and thighs, and pasterns, are all seen to advantage in the well-formed racer, and must predominate in any horse we may select in expectation of being a good galloper. On the other hand, shortness of make, combined with uprightness in the joints, such as we evidence in the dray or cart horse, may serve for trotting, but can in nowise answer the purposes of galloping: it is impossible for spring and speed to result from such conformation. We are not, however, to take it for granted that length of body and limb are the only requisites—that all horses so made can gallop: some there are that have not the faculty of speed, other requirements being wanting. It would, indeed, be a consummation of the equestrian's skill could he in every instance connect speed or action with form, and determine when, for want of the necessary adjuncts, although the form was present, the speed must be absent. As, however, I observed on a former occasion, in consequence of the vital influences having a share in the production of action and speed, there seems faint chance of the horseman ever

arriving at such perfection in his art, even supposing the knowledge to be within our reach: which, by the by, we are by no means assured of.

So long as the horse is cantering or but hand-galloping, the hind feet, advancing in lines either between or to the outer sides of the fore feet, impress the ground somewhere about the places the fore feet have just quitted; as the pace increases, however, the reaches forward of the hind feet become so much the greater, thus proportionably augmenting their leverage; which, combined with their increased quickness of action, accounts for the additional speed. Horses whose chests are not contracted, and who tread close with their hind feet, throwing them well under the centre of gravity, advance them in the interval between the fore limbs; such as have narrow chests or go wide behind throw their hind feet forward in lines outward of the fore ones: in both cases, at speed, the hind feet reaching considerably beyond the prints of the fore feet. And this forward throw of the hind feet underneath the body is one of the best criterions we can have of the horse being a good galloper.

The gallop being the pace of speed, it is natural to ask what feats of dispatch can be or have been performed by our fleetest horses. There is a story still rife among our jockeys, that the renowned Flying Childers ran a mile in a minute. This, however, is an exploit that never was, nor probably ever will be, performed by living machinery: for a course at the rate of sixty miles an hour we must make our medium of transport a steam carriage, and our road a railway. In 1772, however, according to our annals of sporting, a mile was run by Firetail in a minute and four seconds, which appears to be the greatest feat of speed on record*.

* I extract the following account of "The Flying Childers" from Captain Brown's "Biographical Sketches of Horses."

"This horse was well known by the name of the Flying or Devonshire Childers. He was the property of the Duke of Devonshire, who purchased him, when young, of Leonard Childers, Esq., of Cart House, near Doncaster. He was foaled in 1715, and was somewhat more than fifteen hands high. His sire was the Darby Arabian. He ran against the best horses of his day, and was never beaten. He was never tried at running a single mile, but his speed must have been almost a mile in a minute. Carrying nine stone two pounds, he ran over the round course at Newmarket, which is three miles, six

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THE CANTER.

I have already observed that the canter may be regarded rather as an artificial than as a natural pace; not that it is never seen in a state of nature, for, as I said before, foals may not infrequently be seen cantering after their dams: still, however, to perform it well or gracefully requires more training and practice than any other of the paces. Distinguishable at once as the genuine canter is from the genuine gallop, yet may a horse's gallop be so reduced or his canter so increased in speed that it may puzzle any of us to say whether the pace he is going be really a gallop or a canter. Mr. Blaine conceives that "at no period in this pace (the canter) is the horse *all in air;*" "whereas in the slow gallop there is a period in which the legs are all in air; so an essential difference occurs." Were Mr. B.'s *data* founded in fact, the distinction between the paces of canter and gallop would, indeed, no longer puzzle us; but the canter, no more than the gallop, is not uniformly executed by all horses: some horses there are that canter so slowly that, as Mr. Blaine observes, they have "always a point of contact with the ground:" others, on the contrary, there are that at every step in their canter manifestly carry all four feet *off* the ground; and so confound any definition we might construct in accordance with the going of the former. Lecoq calls the canter a gallop with four beats, and thus distinguishes it from the ordinary or hunting gallop, which has, he says, *three* beats, and from the racing gallop, to which he assigns but *two*. I need not, however, repeat here, it is my opinion that these asserted differences are not founded in observation. That, according as the rate of speed varies from the canter to the fleetest gallop, there will be great differences in the *time* of succession of the beats of the feet I have already admitted; but, that their *order* becomes different,

furlongs, and ninety-three yards, in six minutes and forty seconds. He also ran over the Beacon course, which is four miles, one furlong, and one hundred and thirty-eight yards, in seven minutes and thirty seconds; covering at every bound a space of twenty-five yards. On one occasion he made a spring or leap, with his rider on his back, on level ground, of twenty-five feet. Childers died at the age of twenty-six."

or that they become, as in leaping, perfectly *synchronous*, I very much doubt. Unfortunately, it is only in the canter and the slower rates of gallop that the matter admits of any sort of ocular demonstration.

The canter will not only vary as performed by different horses, but will also prove unlike any standard of the pace we may form in our mind according as it has been the product of instruction by a riding-master or as it has come naturally, or been the result of common-place training or practice on the road. The school or manage canter differs from the others in being a performance of more gracefulness, better carriage, and one that calls forth much more exertion of the bodily powers of the animal, particularly of his hind quarters: indeed, it requires certain form of body and action for its perfect execution, and on this account is performable only by horses in possession of such properties. The lopping or road canter—the careless, loose-reined swing in which the neck is straightened and the head protruded—is altogether a different performance of the same pace. Lecoq says, that the elevation of the fore quarter in the canter is the reason why the beats, which in the gallop were simultaneous, become separate and distinguishable, the fore limbs taking longer to descend than the hind ones: since, after all however, both pairs of feet (hind and fore) must take their turns in being planted upon the ground, and since the hind cannot accomplish progression without the aid of the fore limbs, the only difference this elevation of the fore quarters can produce is lengthening the interval the hind feet are upon the ground, according to the prolongation of that of the fore feet in the air.

All paces admit of improvement by practice, none in a greater degree than the canter. No other pace allows of the display of such grace and elegance of movement and carriage, and the manifestation of these is always a proof to us that the animal has either received "lessons in the school," or else has been used by a rider skilled in equitation. It is the easiest of the faster paces to the rider, and, perhaps, the least fatiguing to the horse when he has once learnt to perform it with facility, and on this account is often preferred by gentlemen, always by lady equestrians. A good cantering hack is a valuable acquisition. Some of the foreign

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horses canter with remarkable ease and elegance, a faculty they owe to the superior aptitude they possess over British horses of going upon their haunches; and nothing conduces more to engender this aptitude, where it is not natural in a horse, than school discipline, of which the continental horses in general get, I believe, a great deal more than our own horses do: indeed, with the exception of military horses and a few others, the nags used in this country rarely see the inside of a riding-school.

THE AMBLE.

We might regard what goes by the name of the *amble* as a pace truly artificial had it not been occasionally seen in foals, and, as Lecoq informs us, was it not natural to certain wild animals, in particular to giraffes! All equestrian writers appear to agree in their description of it—in its being a pace performed by the combined operation of the fore and hind limbs of either side; one biped being in the air while the opposite one is upon the ground, and thus alternating their action. Lecoq has happily likened this one-sided action constituting the amble to the gait of two men marching *à la militaire* in open file, with an interval of about a couple of seconds between their steps. We are informed by the same authority that every advance made by either biped amounts to about a third more than the admeasurement from fore foot to hind while the animal is standing still; and that while the pace is performing the hind foot invariably over-passes the print of the corresponding fore foot, thereby obtaining great advantage of leverage.

"If," says Lecoq, "the amble has with reason been banished from the manage, it is no less sought after, on account of the *douceur de ses réactions*, by persons who prefer ease or convenience to brilliancy of pace or action. A distinction, however, must be made between *the ambler by nature* and the horse in whom the pace is the product of education or the result of weakness."

In former days—in those good old days when the pillion was in fashion—the amble bears record of being a pace in considerable request: an ambling horse was a treasure as an easy and safe

roadster, and if not so very expeditious in his movements for a short distance, yet by his untiring continuance at the same rate at the end of a long journey was he found to have gone over more ground, and in less space of time, than any person unacquainted with his stealing pace would have imagined. At the present day, however, one never sees an ambling nag; neither are canterers so abundant as they used to be: walk, trot, and gallop, are all people in these days of reduction of every thing down to the scale of bare *usefulness* seem to care about.

EFFECTS OF MEDICINE ON HORSES.

MERCURY.

IS it not somewhat surprising that a substance which has been in universal use, in human medicine, from the earliest ages down to the present time, and with the most influential and beneficial results, should, in the estimation of most veterinarians, appear of so little service in their practice, that they would care little, perhaps, about losing it altogether out of their pharmacopœia? One cause of this has been the notion imbibed at College —under the late Professor Coleman—that neither mercury, nor opium, nor antimony, &c. evinced any such effects when given to a horse as they did when given to a man; for whatever doctrine young practitioners start with, it takes, in general, a long time before they find themselves in a situation to pronounce upon its soundness or veracity: indeed, some from want of opportunities, and others from want of inclination or industry, to test it, never disencumber themselves of the errors it contains until their eyes become opened by the published contradictions of others. Another reason why mercury has not got into much repute in veterinary practice is its uncertain and deleterious operation; though this is not greater among horses than men. But, said Professor Coleman, "you cannot salivate a horse as you do a man; and if you happen to effect this, you run a risk of starving the animal to death." In respect to these points, farther experience has convinced me that there is not that uncertainty about affecting the horse's system with mercury that appears generally supposed; that his system can be mercurialized in a much shorter time than is commonly believed; and that to insure the good effects and beneficial operation of the mineral, it is by no means necessary that it should be given to an extent to produce salivation. It may be added to what has been already said, as a third reason for mercury being thought slightly of by the veteri-

narian, that but little benefit has been derived from its administration, and that there exist few diseases in which it seems required, or which cannot be cured as well without it. To this I would, by way of answer, say, that as yet we know too little of what may be effected in our practice by mercury—we have made far too insufficient and too imperfect trials of it to, at present, hazard much opinion about its utility.

There has been a good deal of variety of statement concerning the influence of mercury in its purely metallic or liquid form. A vulgar notion prevails, that, if you administer the silvery liquid to a man or to an animal that has a stoppage in the bowels, it will, from its subtle, slippery, insinuating properties, find its way through the obstructed canals, and eventually prove the means of rendering them pervious and traversable again; and it has been asserted that we might, in the metallic form, exhibit almost any quantity of it, it being devoid of medicinal power. By others, however, this has been contradicted: indeed, on the contrary, they say it has proved poisonous. Though the former of these statements appears like the general rule, the latter being the exception, still, both are reconcileable on the explanations afforded by chemical inquiry—that, in some instances, the mercury meeting with oxygen within the alimentary canal, became oxydized, and thus had its medicinal and poisonous properties developed.

In its active forms, as far as observation has hitherto carried us, all animals appear subject to the influence of mercury. The various public hospitals and dispensaries in large manufacturing towns shew how injurious to the constitution even the fumes of mercury are: barometer-makers, and gilders, and looking-glass silverers, and men working in mercurial mines, are continual sufferers. They become the subjects of that sad disease, called the *shaking palsy*, and in too many instances droop, melancholy objects! into their graves. In the *Edinburgh Medical and Surgical Journal* we find the following:—"In 1810, the Triumph man-of-war and Phipps schooners received on board several tons of quicksilver, saved from the wreck of a vessel near Cadiz. In consequence of the rotting of the bags, the mercury escaped, and the whole of the crews became more or less affected. In the space of three weeks 200 men were salivated, two died, and *all the ani-*

mals, cats, dogs, sheep, goats, fowls, a canary bird—nay, even the rats, mice, and cock-roaches, were destroyed."

Of the Preparations of Mercury, all appear to operate on animals with more or less effect: at least, the only dubious of power are the *sulphurets;* these Orfila, indeed, regards as powerless.

Hydrargyri Bichloridum.

The most active and virulent of mercurial compounds commonly goes by the name of *corrosive sublimate*, the *hydrargyri bichloridum* of the last *London Pharmacopœia*. Applied externally it is a caustic of great power; and is capable, when given internally, even in very small quantities, of exerting very great influence in the animal system. From its solubility and extreme diffusibility in large quantities of water, it may, by proper management, be very commodiously administered to the horse in the water given him to drink: his excessive delicacy of smell may lead him at first to suspect something in his drink; but by keeping him for some hours without other water, in general, after a time he takes it, not seeming to care about the admixture. I have in this manner tested its efficacy in ophthalmia, and in glanders and farcy: I wish I could add, with any decided benefit in either case.

Case I.—A brown gelding having incipient glanders, and who had previously been taking large doses of cinchona without producing any effect, either on the constitution or the disease, was, in consequence of becoming decidedly glandered, submitted to the operation of mercury. He commenced with taking hydrarg. bichloridi gr. x, which by degrees was augmented until the large dose of ʒv was given. The horse now, for the first time, left part of his food unconsumed and his pulse became accelerated. With four days' of intermission of medicine he recovered his appetite. The next dose administered was the enormous one of ʒvj, under the effects of which he succumbed. The following morning he shewed alarming symptoms of illness, expressing great pain, frequently lying down and rising again, and being without perceptible pulse; shortly after which a most profuse perspiration broke out upon him. He survived, however, until the next day.

Intense inflammation had seized the lining vascular membrane of the stomach: large portions of effused coagulable lymph adhered to it, and the lymph had a reddened appearance, as though it had already had vessels shooting into it; which was proved afterwards to have been the case. The cuticular coat exhibited no change; and there was but a slight blush of inflammation upon the internal surface of the intestines. Altogether, this horse took, and within twenty-four days, the astonishing quantity of four ounces and twelve grains of bichloride of mercury.

Hydrargyri Nitrico-Oxydum.

Red precipitate, as it used to be called, was given to three horses (Cases II, III, IV) having glanders, in doses, at the beginning, of ℈ij daily; and this in a few days was augmented to ℈iv. On the third day of taking this last quantity, one of the horses refused his food, and soon after was seized with violent diarrhœa, and this continued four days on him, at the expiration of which he died. The stomach proved in a high degree of inflammation; the intestines, also, in an inflamed condition, but not to the same degree. The second horse continued the same doses of medicine four days longer, and then experienced a similar attack in the bowels, but less severe. This one also had his mouth made sore, and became salivated: he cudded his hay and discharged freely saliva from his mouth. The mercury was now discontinued; and, after the subsidence of the bowel-attack, some aloetic medicine was given, with a view of assisting the discharge of the mercury from the system. The horse recovered from the effects of the precipitate, and was subsequently destroyed on account of glanders.

The third horse continued the medicine thirteen days longer than the second, taking regularly his four scruples daily. He was then attacked similarly to what the others had been; not, however, so much in the bowels as in the mouth and salivary glands. He also recovered from the destructive influence of the mercury, but afterwards was put to death on account of being incurably diseased.

Hydrargyrum cum Creta,

As every medical man knows, is a slate-coloured powder, the result of extreme mechanical division of the mercury amid the chalk, and, perhaps, of some partial oxydation of the former. It may be prescribed for horses in doses varying from a drachm to an ounce; and will be found useful in disordered states of the alimentary canal, and of the biliary and pancreatic secretions. In diarrhœa, I have found it very serviceable in restoring healthy action and secretion. In cases where the state of the stomach or bowels forbids the use of calomel, and yet mercury in some form appears desirable, this will be found a very proper medicine. As an *alterative*—when the animal is hide-bound and does not make flesh, and voids dung offensive in odour and unnatural in colour, and altogether assumes an unhealthy aspect, and is weakly with it—doses of hydrargyrum cum cretâ, alternated with aperient doses of aloes, are often attended with the happiest results.

Hydrargyri Chloridum.

The *calomelas* of the London Pharmacopœia for 1720—is on various accounts the form of mercury usually administered both in human and veterinary practice: indeed, in respect to the former, it has been truly said by Dr. Spillan—"there is no article in the materia medica more frequently used, or more grossly abused, than calomel." It may be regarded as, in general, a mild and safe form for the exhibition of mercury. The surgeon would not know what to do or where to seek a substitute, were he deprived of calomel: no bottle in his pharmacy is oftener called into requisition than that labelled "hydrarg. sub-murias" or "hydrarg. chlorid." The veterinary surgeon has never been without calomel among his medicaments—has had frequent recourse to it in his practice; and yet, notwithstanding the great repute in which it is held among surgeons, to him—in his horse-practice at least—it appears to have rendered so little service, that it would seem as though he set but little value upon it; unless it be as an alterative, or to confer, by admixture with aloes, increased power on his "dose of physic." In former times, calomel stood in some repute as an anthelmintic or vermifuge: but nowadays

we have, or think we have, medicines better adapted for that purpose; and, in consequence, mercury so far is discarded. I shall, first, shew by the experiments I have made, what the real or simple effects of calomel are on horses; and, secondly, point out those diseases in which I conceive it may be administered with advantage.

Case V.—A horse was brought to me having (from a blow, I believed) the transparent parts of one of his eyes completely obscured, from effusion of lymph into the anterior chamber. Take some blood from the jugular vein of the same side, and give daily the following ball:—

℞ Hydrarg. chlorid.....3iss
Pulv. opii.....ʒj
Farin. sem. lini.....ʒss
Theriac. q. s. ut. fiat bol.

At the expiration of a week the eye appeared clearing. Continue his balls, and let him have blown into his eye, daily, one of these powders:—

Pulv. zinci sulphat.....gr. vj.
Pulv. sodii chlorid.....ʒiss
Pro pulv. vj.

By the time he had taken ten balls—two ounces all but a drachm of calomel—his mouth became sore, and he cudded his food. His eye recovered; the effects of the mercury gradually subsided; and, in the end, all did well.

Case VI.—Another horse took the same quantity, ʒiss of calomel, daily, for chronic specific ophthalmia affecting both eyes; but without opium. The consequence was, diarrhœa was produced. Half-a-drachm of opium was now added to each ball. The diarrhœa ceased, and the eyes became much benefitted; and the horse was afterwards sold. No sore mouth, in this case, was produced, although twelve balls were taken—eighteen drachms of calomel: a circumstance accountable for on the score of the medicine at first running off through the bowels.

Case VII.—To a horse suspected of having the glanders, and given up for experiment, three drachms of calomel were given, mixed with linseed meal and syrup into a ball. No discoverable effect ensued. Four days afterwards, half an ounce of calomel

was administered, similarly compounded. On the evening of the second day after its administration the horse became dull, and off his appetite. On the third day he appeared very uneasy, but manifested no symptoms of cholic or decided pain. He lay down much, refused all food, but drank some water. The pulse was quickened, and there was a good deal of hollowness—"tucking up"—in his flanks. When made to rise, he stood "all of a heap," "sticking up his back." His dung had become pultaceous; but the softening never amounted to actual purgation. In the end he was destroyed.

The surest and quickest and safest manner in which the horse's system can be put under the influence of mercury, is by the administration of calomel in moderately large doses at short intervals, guarded by opium. I have, during the prevalence of the epidemic, which has hardly yet subsided—I have a case under treatment at the time I am writing—adopted the practice of submitting all such cases as have manifested any dangerous symptoms to the action of mercury; and I have found that a drachm of calomel, combined with five grains of opium, given, without intermission, every eight hours, has ordinarily, on the third or fourth day, affected the mouth: pinkiness of the gums and fetor in the breath have been the first indications; cudding of the food has followed, when the mercury has been continued. In no case, however, have I found it necessary to produce this latter effect; not in all, indeed, has it been found requisite to push the mercury so far as even to affect the gums: the disease giving way—whether, as I have believed, from the influence of the mercury or not—has always been the signal for me either to discontinue the medicine, or to diminish the dose, or to lengthen the intervals of its repetition. Latterly, I have abstained from blood-letting altogether in the epidemic. When but slight, I have made use of very simple treatment; when severe, I have entrusted the case to mercury, and I can add, that, hitherto, I have had some reason to be pleased with my new plan of treatment.

In regard to the influence of mercury over the periodic or specific ophthalmia, I have, at times, imagined that a good deal of benefit has been conferred; while, again, other cases have dispersed all my fond hopes. When the case is not of the specific

character, but the inflammation, the effects of which we are desirous of getting rid of, has been of a common nature, I have seen the happiest effects from the action of mercury.

Speaking of the operation of mercury, it is surprising how comparatively little will, in some horses, take effect, while others appear all but insusceptible of its action. I have known ten grains of calomel, given twice a-day, make the mouth so sore on the fifth day, that the horse (a four-year-old one) cudded his hay: opposed to which, I will now narrate a case in which calomel and blue pill, and inunction with mercurial ointment, was carried to an extent to destroy life without any appearance of salivation.

Case VIII.—A three-year-old mare, in fat condition and with all the outward appearances of a healthy and sound constitution, though at this time the subject of farcy and glanders, having one small and one large spreading ulcer visible upon the septum within the off nostril, and three small ones upon the near side; submaxillary glands of both sides swollen; and three ulcers remaining upon one shoulder, where she has lately had an attack of farcy. The object being to produce ptyalism, with a view of discovering what effect such would have on her disease, she was ordered to take, morning and evening, hydrarg. chlorid. ʒj, c. far. sem. lin. et theriac.; to have unguent. hydrag. fort. ʒiss rubbed into the inner part of each thigh morning and evening, and to have her sores dressed with pulv. hydrarg. nitrico-oxyd. The calomel was continued for three days: on the fourth she commenced taking in lieu thereof pil. hydrarg. ʒi morning and evening, continuing the inungation and dressing to the sores. On the sixth day (from the commencement) the mare did not eat all her allowance of hay: on the seventh day she refused her food, and for this and the ninth day, on that account, her medicine was discontinued; the inungation and dressing being used as before. On the tenth day she resumed her blue balls, the dose being reduced to ℈ij, and had the ointment rubbed in as before: she feeding better again, and continuing to do so until the fourteenth day, when she was again much off her appetite. Still, seeing her disease was daily and hourly increasing, both ball and ointment were persevered in; the result of which was that she lost all appetite, and manifested disturbance in her respiration, and acceleration of

pulse. Still, the medicine was continued, and the mare in consequence died suddenly some time in the night of the twentieth day of the experiment. Although this mare took six drachms of calomel, nearly two ounces of blue pill, and had seven ounces and a half of blue ointment rubbed into her thighs, salivation was not produced; nor, indeed, were there any very evident symptoms of sore mouth, for she never cudded her hay: the mercury, however, affected her in another and in a fatal way. But on the disease it had certainly no good effect: on the contrary, it appeared to aggravate her malady.

The case with which I shall conclude this account is one that followed and appeared to arise from the exhibition of mercury—in fact, resembled much the disorder surgeons have named "mercurial erythema."—I never witnessed its like before, and hope I never shall again.

Mercurial Erythema.

The mare, the subject of the above rare and singular disorder, had, two years before, laboured under all the symptoms of "broken back," of which, after a long course of treatment, she had completely recovered. The next time she was brought to me was for being lame, apparently in the off fore *foot*. She recovered from her lameness, and was a third time made my patient for a cutaneous affection of the same fore limb, spreading upon the back of the knee and cannon; and which, by purgatives and lotions used with bandages, was speedily removed. Three months afterwards the same returned, and was now accompanied by tumefaction of the leg and heat of it. She was blooded from the plate-vein, took purgative medicine, used the warm bath, and subsequently had recourse to lotions and bandages again. She recovered in a month. In another month she had a relapse of her skin affection; and this time took alterative doses of calomel for it, and used *unguent. picis liquidæ;* and with this treatment, in five or six weeks, got well again. Three months after this third recovery, she returned again with the same complaint.

The limb now was swollen from the knee downwards; it was bare of hair; the surface was covered with pimply eruptions; upon the back of the knee scurfy, above and below, for the space of two hands' breadth; the parts felt warm, and appeared itchy. Give her at night, in her mash, hydrarg. chlorid. 3j; and let her take, next morning, bol. cathart. Use lotio plumb. diacet. dilut., with bandage to the leg. The physic worked well, and carried away all the swelling; leaving heat of surface of skin and desquamation. Let her take, every night, hydrarg. chlorid. 3j, and use the following ointment:—

℞ Unguent. picis liquidæ..... ℥iv
Hydrargyri bichloridi..... 3j.—M.

After she had taken eight of the powders of the chloride, her limb looking very much benefitted, she was ordered a dose of physic. This operated sufficiently—not immoderately—but, on the day of the physic "setting," the mare seemed languid and unwell while out at exercise, and was in consequence led back to her stable. From this time she was kept in her stall, looking dull and refusing her food, but without any manifest disease or symptom of pain. On the second morning after the setting of the physic, the mare was found lying down, apparently very ill, and unable to rise. With much difficulty she was made to rise, and was got into a loose box. I was called to her at nine o'clock the same morning. I found her standing very infirmly upon her legs; with her joints quivering as if ready every instant to give way under her; evincing great prostration of strength: respiration agitated; nostrils dilated; pituitary and conjunctival membranes as red as scarlet, and also the buccal membrane and covering of the tongue; and, from the red aspect of a bare place upon the knee affected, it is imagined that the *cutis vera* may be in the same highly injected condition. The pulse, though small and weak, could be felt, but hardly distinctly enough to be reckoned. Purgation had commenced afresh, and was going on freely, with the discharge of much *flatus*. With a countenance full of anxiety, she expressed pain in the abdomen by looking back frequently at her flanks. She soon lay down, and stretched herself out at full

length, occasionally lifting up her head, and looking towards her abdomen, and groaning. She freely drank of water-gruel made warm: the giving her which, and keeping her box cool and well-ventilated, is all that was done to her. She survived but three hours and a half after I was called to see her. She died quite suddenly, and without a struggle.

Autopsy.—No morbid appearance discoverable. The mucous membranes of the stomach and intestines, as well as the peritoneum and all the viscera, in a state of health.

ARSENIC.

The common white arsenic of the shops—the Acidum Arseniosum of the London Pharmacopœia—is a mineral so universally poisonous that vegetables, as well as animals, suffer and die from its influence. Seeds soaked in a solution of arsenic are deprived of the power of germination; buds immersed in it lose their capability of development; plants watered or rubbed with it, die; and to animals, without I believe an exception, arsenic proves a deadly poison.

Notwithstanding its universality and virulence as a poison, arsenic has long been introduced into medicine as a remedy for certain diseases, and has been, and continues to be, extensively used, both externally and internally. In minutely divided doses, such as the twentieth of a grain, continued for a considerable time, it is said by some to have a tonic effect upon man; to augment his appetite, improve his digestion, and increase his strength. In larger does—from the twelfth to the sixteenth of a grain—arsenic has proved a valuable remedy in certain diseases of a periodic nature, and particularly in intermittent fevers, in which it has been known to succeed even where cinchona and quina have both failed. Over diseases of the skin, arsenic has also manifested considerable power, both as an internal and an external remedy. Indeed, Sir Benjamin Brodie has shewn, by experiments on dogs and rabbits, that where arsenic has been employed externally, applied to wounds for example, the inflammation arising in the stomach and intestines has been more violent than even in cases where the mineral has been given internally.

The same eminent physiologist has likewise made it apparent, from his experimental researches, that arsenic acts as a poison by causing suspension of the functions of the heart and brain through absorption of it into the circulation; and also, that, though arsenic was but applied to a wound, or inserted underneath the skin, the animal died with the same symptoms of inflammation of the mucous membrane of the stomach and intestines as though it had been exhibited inwardly.

Administered to horses, arsenic is no less certainly poisonous than to other animals; though enormous doses of the mineral have been, on some occasions, given, without such effects following as might, from its known efficacy, have been reasonably looked for. A horse suspected of having glanders, a patient of my father's, was, at the suggestion of Professor Coleman, submitted to the efficacy of arsenic given in powder, made up into balls with linseed meal and treacle. On the first day a drachm was prescribed, and this dose was augmented by one scruple daily for seventeen days, the horse consequently taking on the last day, in one ball, six drachms and one scruple of the mineral; making the aggregate of his doses seven ounces, six drachms, one scruple, or very nearly half a pound of arsenic in the course of the seventeen days, and yet he never once refused his food, nor had any disturbance of his pulse or respiration, nor evinced any pain or uneasiness. From the progress his disease had made while under the experiment he was now destroyed. His stomach bore evidence of virulent inflammation and its vascular lining was coated with coagulable lymph. The case constitutes one instance, among many, where horses have shewn, after death, intense gastritis, without having, during life, evinced any symptom of the existence of such disease.

The following experiment will shew by how much less quantity of arsenic some horses will be affected, even to destruction. Three horses having glanders were, after being subjected to treatment for their complaints which had failed in affording them any relief, submitted to the operation of the common white arsenic. Five-grain doses were prescribed to be administered daily, in balls made up in the ordinary way. On the fourth day, one of them, having during the interval become sadly disordered

from his glanders, was shot. On the fourth day after this—the eighth from the commencement of the experiment—the balls having, since the death of the other horse, been administered to the surviving two, morning and evening, one of them was attacked with shivering, loss of appetite, symptoms of great abdominal irritation, diarrhœa, prostration of strength and imperceptibility of pulse. The other was also similarly affected on the day following. The latter, however, recovered; while the former died, poisoned by the arsenic. In the end, the survivor was shot, on account of his disease having assumed the acute and incurable form.

Here we have an example of little more than two scruples of arsenic producing gastro-enteritis to an extent that caused the death of one horse and put in jeopardy the life of another. Idiosyncrasy, and other circumstances, unmentioned, unobserved, or unobservable, will, probably, be required to account for such strangely discrepant results. One fact bearing on the explanation may, however, be mentioned here, and that is, the known difference, frequently coming under notice, between giving medicine in one large dose and administering the same quantity in small or divided doses, at frequent intervals: it appearing, in the one case, that a large proportion of the medicine—especially of such a substance as arsenic, which is so sparingly soluble in water—passes out of the bowels unchanged, or, at all events, unabsorbed. Two ounces of cathartic mass given in one dose, will be likely to purge a horse less violently and dangerously than a less quantity divided into drachm doses, and given at intervals of a few hours. I have frequently made the same observation in regard to mercury and some other medicines. Indeed, among horse-dealers, it is a trite remark, that a dose of physic broken into three or four parts "does a horse more good," *i. e.* takes more effect upon him, than it would have done given in one dose. Dr. Philip, in advocating "The Influence of Minute Doses of Mercury," observes, "It is remarkable that, notwithstanding the general and long-continued employment of mercury, it should not have been known that all its constitutional effects, not excepting complete salivation, may generally be obtained by such doses as *half, or even a third part, of a grain*

of blue pill taken three times a day: that is, a dose only equal to the twentieth, or thirtieth part of a grain of calomel; for a grain of calomel is equal, whether we regard its purgative, or, when divided into minute parts, its alterative effects, to ten grains of blue pill. In another place we find the same eminent physician setting it down as "the result of his own experience" ("and there are few," he tells us, "whose attention has been more directed to the subject"), "that, although there are circumstances under which large doses of mercury are not only beneficial but essential, the quantity employed in this country has, on the whole, been, at least, *ten times greater* than that from which its most beneficial effects could accrue."

As veterinarians, I think, we may admit that there is much truth in these remarks of Dr. Philips'. No doubt, a great deal more medicine is given than comes into operation, the effects increasing nothing like in ratio with the dose; and that small doses are in general to be preferred, being more efficacious in proportion than large doses, providing they are given at short intervals and for a length of time continued. In a case or on an emergency where a certain palpable effect is required to be produced within a given time, there can be no question about the absolute necessity of administering a certain large or determined dose of medicine; but, when the case or circumstances are of a nature not to admit of immediate removal or palliation, on the contrary are such as can be benefitted only by the gradual working of the remedy and the course of time, the system is in general more perfectly saturated with the medicine, and less harmlessly so, administered in minute doses at frequent intervals than in larger doses at longer intervals. I am, however, letting the consideration of this interesting point lead me away from my immediate subject—the medicinal properties of arsenic.

About the time these experimental inquiries were making, what was called "The Tasteless Ague Drop" was in great repute: an empirical remedy, that was afterwards successfully imitated by Dr. Fowler, who found it to be a preparation of arsenic. Fowler's Solution, as it used to be called, was an *arseniate of potash*: an alkaline solution of the mineral, which has since been introduced into the London Pharmacopœia under

the name of Liquor Arsenicalis. This is much the most convenient and safest form of exhibiting arsenic in human medicine, and in general is that which will be found the preferable one by veterinarians: there being neither perceptible smell nor taste in the solution after it has undergone extreme dilution, it has always been by myself exhibited in the horse's ordinary beverage —plain cold water. Should his delicately perceptible organs of smell appear to detect something foreign in his water, the suspiciousness—for the aversion seldom amounts to more—will be overcome by keeping the animal without any other but the medicated water. I will here transcribe two cases from my Register, which will, I think, sufficiently elucidate the effects of arsenic in minute division in solution.

Case I.—*May*, 1812. A horse, looking well in condition and feeding well, with a pulse ranging between 40 and 50, and bowels in their natural state, but affected with glanders, having ulceration within both nostrils and enlargement of the submaxillary lymphatic glands, was subjected to the operation of arsenic.

May 16*th*.—The first dose administered was an ounce of a solution of arseniate of Potash, in which was contained half a drachm of arsenic*.

17*th*.—Off his feed. Repeat the dose.

18*th*.—More off his feed; pulse 60. Repeat medicine.

19*th*.—Eats little or nothing; seems very sick. Continue the medicine.

20*th*.—Expressing a great deal of pain by pawing, gnawing his hay, &c.; respiration quickened and oppressed; failure of strength, manifested by staggering and all but falling when he moves; pulse 90, and thready. Discontinue the medicine. At half-past ten o'clock, p. m., he died.

The first circumstance noticed on proceeding to make a post-mortem examination, was a most oppressive fœtor proceeding from the cavity of the abdomen, which became so intolerable the

* The Fowler's solution employed in these experiments had, therefore, the strength of nearly four grains to the fluid-drachm; whereas the Liquor Arsenicalis of the London Pharmacopœia contains but half a grain to the drachm.

instant escape was given to the gas with which the bowels were distended, that myself and others in attendance not only found ourselves compelled to compress our nostrils between our thumbs and fingers, but at length were obliged, so overcoming and disagreeable was the stench, to leave the box for a minute or two. As soon as we had recovered somewhat from the effects of it we proceeded with our examination.

The Stomach exhibited no alteration upon its cuticular surface, but upon the villous existed a great deal of inflammation; and the inflammation appeared in spots or patches. In places where the reddening was most intense the texture of the tunic appeared softened and disorganized; and, in addition, the entire villous coat presented much increase of substance, or *thickening*. The inflammation extended into the duodenum, and also was, in places, apparent in the other small intestines; but as for the large intestines, the cæcum and colon at least, they were in a perfectly gangrenous condition. Their villous linings, particularly that of the blind pouch of the cæcum, were both black and rotten, owing, perhaps, to the lodgment and longer detention of the medicine in these parts.

The Liver was paler than usual; but otherwise without apparent change.

The Lungs were tuberculated, and, in other respects, shewed the prior existence of disease. They were, however, in addition, greatly congested, and quite black, a condition partly ascribable to the hard death the animal died; but also, no doubt, owing to the arsenic—it being evident, from their odour, that they contained some of the same kind of gas which pervaded the abdominal cavity.

Case II.—In March 1813, a black horse, nine years old, in excellent condition, fine in his coat, very muscular, and having an appearance of being sound in constitution, with an appetite as good as that of any horse in perfect health, although the subject of glanders, was submitted to the operation of the same solution as was exhibited in the foregoing case.

March 21*st*.—He drank ʒi of the medicine in his pailful of water, and had the same repeated in the evening.

22*d*.—Two drachms of the solution twice a-day.

23*d* and 24*th*.—Three drachms twice a-day.

25*th*, 26*th*, and 27*th*.—Half an ounce twice a-day.

28*th*.—Five drachms twice a-day.

29*th*, 30*th*, and 31*st*.—Six drachms twice a-day.

April 1*st*.—For the first time he refused his food; in consequence of which the dose was given but once on this day.

2*d*.—His appetite being amended, he took half an ounce twice a-day.

3*d*.—He took five drachms twice a-day.

4*th*, 5*th*, and 6*th*.—He took six drachms twice a-day; though on the last day he again loathed his food.

7*th*.—He could not be induced to drink any of his water, and therefore seven drachms of the solution were mixed with a pint of water and administered as a drench.

8*th*.—The same drench was twice repeated, notwithstanding his appetite had again become fastidious.

9*th*.—Only ʒvj were given morning and evening.

10*th*.—Being more off his feed, the dose was reduced to ʒiij twice a-day.

11*th* and 12*th*.—Only ʒij were administered twice a-day.

13*th*.—The same dose was given but once.

14*th*.—His appetite having completely failed him, the medicine was discontinued. His pulse is 60, and he has visibly lost much flesh, being reduced from a fat and fine-coated horse to a thin, rough-coated, unhealthy looking animal. No effect appears to have been produced by the arsenic on the glanders: the disease has made its usual progress.

18*th*.—The animal was destroyed. There is, unfortunately, no account of the post-mortem state.

The former of these cases exhibits a good example of what we may expect from arsenic in solution, given in over-doses—in doses such as the system cannot support. The latter one instructs us what doses are in general admissible; at the same time that it shews that the mineral possesses no anti-glanderian virtues whatsoever. From ʒi to ʒiv of a solution containing ʒss of arsenic in a fluid-ounce appears to be a safe or medium dose for a horse in health; and as, by long or frequent repetition, we may, even by such doses, in time work mischief, it is a

medicine whose administration should be narrowly watched. I have exhibited it in periodic ophthalmia, as well as glanders, but with no better success.

COPPER.

Cuprum, *copper*, has from the earliest times down to the present been employed in medicine. It is thought that even Hippocrates used it as a remedy for the disorders of men; and there is scarcely a book on farriery, however old its date, in which we do not find some mention made of it as a therapeutic agent for the diseases of horses. *Blue vitriol*, *Roman vitriol*, *blue stone*, are the appellations the *sulphate of copper* formerly went by, this being the preparation whose use has been so ancient as well as extensive both in human and veterinary medicine.

In the metallic state, copper, like other metals, appears devoid of any medicinal power. Children, we know, swallow halfpence with impunity, and dogs have had bolusses composed of copper filings given to them, without their being productive of any apparent harm. Should any process of oxidation, however, take place from acids incidentally present at the time within the alimentary canal, an oxide of copper will be produced, and that may exert considerable medicinal action. The preparations employed in veterinary medicine are the sulphate and the acetate of copper.

Sulphate of Copper, commonly known as *blue vitriol*, or *blue stone*—a compound of sulphuric acid and copper, presented to us in the form of beautiful blue crystals—has become as a remedial agent so great a favourite with the veterinarian, that for general purposes, outward as well as inward, no medicine in his pharmacy is oftener resorted to by him. Internally, blue vitriol has for years, I might almost say ages, been exhibited as a remedy—a specific, indeed—for farcy and glanders, and has been supposed to have a tonic or strengthening effect as well. In large doses its action becomes poisonous. The following cases will serve to shew the effect it takes on horses, as well as tend to exhibit its value as an antidote for glanders and farcy.

Case I.—A black gelding had incipient glanders, in other respects manifested good health. It was agreed—between Pro-

fessor Coleman and my father—that he should take the sulphate of copper, in order that the effects of the medicine might be ascertained. He commenced with the dose of an ounce daily. On the day the fourth dose was administered the horse was seized with violent purgation, at the same time expressing nausea and occasional griping pains, and bursting out into profuse sweats. The medicine was discontinued, and all the symptoms of pain and danger ceased, and the animal once more recovered his former state of health, although, in the end, the glanders proved fatal to him.

Case II.—A bay gelding, having chronic farcy, in an advanced stage, in one hind extremity, which was now in a state of extreme tension and suppuration, and was occasioning a great deal of uneasiness, had the actual cautery applied to his diseased limb, in a transverse direction, with a view of intersecting the absorbent vessels, and thus cutting off the communication between the sound and diseased parts. But this operation had not been performed many days before fresh attacks of the absorbents appeared in various parts of the body. The case now becoming desperate, my father felt desirous to make trial of "a new remedy," one that had been "much lauded by a modern practitioner as infallible;" this was the sulphate of copper. It was administered in half-ounce doses for eight successive days, not only without benefit, but with the accession and rapid progress of glanders during its operation. My father expected to have found the stomach and intestines inflamed by the copper; but they proved totally free from alteration.

Case III.—In June 1801, a horse came under my father's care for treatment for farcy combined with glanders. Neither of the diseases having made much progress, it was thought advisable to give trial to the sulphate of copper, in divided doses. For the first eleven days one drachm of the medicine was given daily. On the four following days the dose was augmented to one drachm and a half, and this was given morning and evening, at the expiration of which period, the horse having lost his appetite and had some laxative effect produced on the bowels, the medicine was discontinued. Ten days afterwards, Mr. Coleman seeing the horse, was desirous that an experiment

should be made on him with *digitalis*, the result of which shall be made known on a future occasion.

Case IV.—There existing some difference of opinion between Mr. Coleman and my father respecting the cathartic powers of the sulphate of copper, a fine chestnut horse, at the time under sentence to be destroyed on account of glanders, was made the subject of experiment, with a view of settling the question. For the first five days half an ounce of the copper was exhibited daily, at the expiration of which time the animal beginning to loathe his food, and there being some acceleration of the pulse, the dose was reduced to three drachms daily. In two days more the appetite had become so bad that the discontinuance of the medicine for a day became compulsory. On the day after—being the ninth from the commencement—the fæces proved to be "a little softened:" half an ounce of the copper given. Tenth and eleventh days, the dose was increased to an ounce; and on the twelfth, thirteenth, fourteenth, and fifteenth days, ounce-doses were administered three times each day, without again altering the natural state of the fæces.

The sulphate of copper is not to be classed among either cathartics or laxatives. In such large doses as an ounce, it speedily creates nausea and loathing of food, and febrile disorder, followed in many, perhaps in most, instances by griping pains and diarrhœa: and these disturbances, should the medicine be continued, end in death. Half-ounce doses, persevered in for any length of time, will often produce the same effects. But in one or two-drachm doses, and especially in the form of solution—a formula much lauded by Professor Sewell—the sulphate of copper may be exhibited with safety, and in some disorders with advantage. To deny that its administration has been attended with benefit in glanders and in farcy, would be to run in the face of the experience of ages, and of all our professional forefathers' observation and assertion. We have neither right nor reason for saying that blue vitriol formed an useless or ineffectual constituent of their "farcy balls." My father's farcy ball—and my father, in those days, was assisted in his practice by Professor Coleman—was composed of cupri sulphatis ʒij, antimon. potassio tartrat. ʒiij, terebinth. vulgaris q.s. ut fiat bol., and this ball was given,

when no experiment was making, in every case of farcy that occurred, and was considered, in many of them, to cure the patients. That sulphate of copper possesses any *specific* powers over either farcy or glanders, I, for my own part, scruple not to deny; although I admit I am ready to believe, that, of many cases of farcy, and of some even of glanders, it has, in its operation on the system, assisted in the cure. As a *tonic*, copper would give tone and vigour to the constitution; and might, where there was a natural tendency to counteract or throw off any morbific poison, aid the constitutional powers in their salutiferous operations. As an *astringent*, it would check or repress the secretions of mucous and ulcerous surfaces. The turpentine combined with it —in the *farcy ball*—would add to its astringent effect upon the discharges, and produce a diuretic effect as well, and thereby further co-operate in the health-restoring processes. In some such ways as these we may account for sulphate of copper curing some cases of farcy and certain ones of glanders, and, perhaps, satisfactorily enough, without attributing to it properties which, in my opinion, it never possessed. And I quite agree with Professor Sewell in the preference of the *liquid* over the *solid formula*. It stands to reason that, in a state of weak solution, the mucous surfaces of the bowels must be subjected to less irritation or annoyance from it than when administered in substance; and I think it likely that the addition of mucilage to the draught may still further diminish this liability. Against this, however, we have to set the objections existing, and not without reason, to drenching. My own maxim in practice is, never to prescribe a draught where a ball can be made to answer the same purpose. In such cases, however, as the present, where the medicine is of a caustic or escharotic nature, and where repetition and long persistence in the use of it become absolutely necessary, the liquid form may be chosen; great care being exercised in the administration of the drenches.

As a TOPICAL REMEDY, the sulphate of copper is so generally and extensively employed, that, without their "blue wash" veterinarians would hardly make their way in practice. It would be idle for me to pretend to point out in how many ways it is, and may be, made useful; I shall only in conclusion observe, that, of

the other preparations of copper introduced into veterinary medicine—the subacetate and the diniodide—the former is found exceedingly useful, as a topical agent, in thrush, canker, &c., and the latter has been presented to us by Mr. Morton as the most efficacious preparation in which we can employ copper in farcical and glanderous affections.

IRON.

While our forges are ringing with the clang of iron in the manufacture of horseshoes, few veterinary pharmacies are without the metal in some form or other, it being found useful as a remedy for certain states of disease, and for debilitated conditions of body. Like the other metals, in its pure mineral state it appears to be inefficacious; it readily, however, oxydizes, both within and without the body, and in that form exerts some influence, mild though it be, on the animal constitution. Forge water, as it is called—the water from the trough of the forge in which the heated horseshoes are cooled—strongly impregnated as it is with iron, may be regarded as a powerful chalybeate, and was in former days not infrequently exhibited as a medicine to horses: I have myself administered it by way of a tonic, but I have no recollection of having noticed any particular benefit derivable from it. Of the preparations of iron, that in most common use in veterinary medicine is

The Sulphate of Iron, or *Green Vitriol*, as it is often called, or *Copperas*. It has for years enjoyed among us a high character as a tonic; and though, perhaps, of late years it has been less used than formerly, it still constitutes the basis of the *tonic mass* of most of the old practitioners.

With a view of testing the efficacy of green vitriol in glanders, and, at the same time, of ascertaining its general effects on the constitution, the following experiment was made:—

Case I.—On the 2d May, 1821, a brown horse was admitted into the infirmary at Woolwich for acute glanders. The horse was taken from a stable in which another, since destroyed for the same disease, had stood; and two other horses of the same proprietor a day or two afterwards exhibited suspicious symptoms.

The subject of the present experiment is in good condition, of middle age, and assumes every aspect of health, putting the (local) disease out of the question. The submaxillary glands of the near side have grown, altogether, as large as a hen's egg; the membrane upon the correspondent side of the septum has that red and glistening appearance which betokens the approach of ulceration; indeed, when the light can be made to shew the upper part of the septum, an ulcer of a square form and healthy aspect is distinctly visible. The discharge from the affected nostril is of an aqueous character.

May 3*d.*—Let him take, morning and evening,

Ferri sulphat.
Potass. subcarb. aa ʒss.
Theriacæ q. s.

4*th.*—A pimple appears upon the lower part of the septum, having a yellow point and transparent aspect. Repeat ball morning and evening.

5*th.*—Nasal discharge becoming mucous, with some flaky purulent matter. Continue ball.

6*th.*—Let him take his ball thrice a-day.

7*th.*—Two small foul ulcers have formed upon the ala nasi. His dung has become of an unusually dark colour, and is voided in small balls, leading us to believe that the iron is somewhat constringing his bowels.

8*th.*—No alteration. Continue ball.

9*th*, 10*th*, 11*th.*—Let him take two balls morning and evening: being two ounces of the vitriol daily.

12*th.*—The pimple has disappeared, leaving incipient ulceration. The other ulcers have become improved in appearance.

13*th*, 14*th*, 15*th.*—Continued his balls as before.

16*th.*—More discharge from the nose than there has hitherto been. Let him take three balls morning and evening—three ounces of the salt daily; and apply some liquid blister to the enlarged glands.

17*th.*—He hangs his head, is depressed in spirits, and eats nothing: he appears nauseated by the medicine. Discontinue it.

18*th*.—The pulse, which yesterday was hardly perceptible, has got up, is now 65, and strong; and there is an appearance of irritability and startlishness about him.

19*th*.—The disease in the nose has exhibited much aggravation within the last four-and-twenty hours. Fresh ulceration has supervened, and the discharges are more profuse and purulent in character.

22*d*.—It is of no use recurring to the iron again; for the symptoms have been growing worse ever since it came into operation. Transfusion was attempted on an ass six months old, but the experiment failed.

23*d*.—The horse was destroyed by inflation into the jugular vein.

LEAD.

As an external medicament, no substance has been held in greater estimation, or been more generally used, than lead; and though surgeons of the present day ascribe less efficacy to it than did Goulard and his followers, yet it is still a frequent and favourite application to inflamed or swollen parts, and one that is believed to be productive of a great deal of benefit. Many veterinary surgeons are likewise in the habit of employing "Goulard lotion," as it is commonly called—the *liquor plumbi diacetatis dilutus* of the present London Pharmacopœia—but with what amount of efficacy seems rather doubtful. Professor Coleman declared it to be, for horses, in any strength, no better than so much cold water. And I must confess, though I use it, I have my misgivings, myself, about its local operation. It has one decided advantage—it has the appearance of being, and is by the public considered to be, *medicinal*.

What, perhaps, has tended to confirm its topical efficacy in human medicine has been its known power of producing even deleterious effects when administered in very small quantities as an internal medicine: nay, the very effluvia of the mineral arising from surfaces recently painted is sufficient to excite in some persons very unpleasant effects or sensations; and we all know how generally unhealthy is the aspect of men employed in painters' work. This has deterred surgeons from prescribing lead to the degree or extent they otherwise might have done; and though they

do so on occasions, in some diseases, with manifest advantage, every now and then it has happened that very unexpected and alarming symptoms have followed its exhibition. In respect to horses, I have given the ACETAS PLUMBI—the *sugar of lead*, as we call it—both in glanders and in periodic ophthalmia: in neither disease, however, with any visible benefit. Its exhibition was as follows:—

To the first, a glandered horse, it was administered for several days in half-ounce doses morning and evening, without producing any effect, either on the disease or state of health of the animal.

To the second horse, having periodic ophthalmia, it was given in ounce doses twice a-day for five days, without any noticeable result.

To the third horse, glandered, it was given on the first day, in the dose of an ounce morning and evening; on the second, this dose was doubled; and on the third and fourth days, the two-ounce doses were continued morning and evening. On the fifth day, the horse refused his food, and had an intermittent pulse; therefore the medicine was omitted. On the sixth day, however, the same doses were repeated; but on the seventh day they produced such alarming return of the symptoms of nausea, dejection, and derangement of the pulse, that the medicine was from this time discontinued altogether.

In neither case did any symptoms of colic or palsy present themselves.

ZINC,

ANOTHER of the metals which, in veterinary medicine, has been more used as an external than an internal remedy: indeed, zinc has hardly yet found a place in our pharmacopœia as a medicine. I have notes by me giving some account of the exhibition of the *sulphate of zinc;* and I have, myself, administered in considerable doses the *oxide.*

Sept. 2*d*, 1804.—Two horses, in good condition, though having chronic discharges from the nostrils, commenced with taking doses of half an ounce of the sulphate three times a-day, which they continued until the 14th, without manifesting any change either in ap-

petite, pulse, or general appearance. The dose was now augmented to an ounce thrice a-day, and at the expiration of four days from this, both horses manifested nausea, and appeared salivated, and refused their food. The medicine was discontinued for three days, and then resumed; it having been remarked in the interval that large quantities of urine had been voided. Two days afterwards, the disease in the nose having shewn a tendency to spread, one horse was destroyed. His stomach displayed inflammation upon its vascular lining; but there was no other disease. To the other, the doses were still farther augmented, but without any novel result.

April 1*st*, 1813, a brown gelding came under my care for treatment for glanders. He was but three years old, and looked well in health and fine in his coat, although he had two distinct ulcerations inside his off nostril; his submaxillary glands enlarged on the same side; with corded absorbents and two or three ulcerations upon the off shoulder. He feeds well and his bowels act regularly.

Let him take, morning and evening, half an ounce of the oxide of zinc, in ball, and have his swollen glands blistered, and his ulcers dressed with solut. cupri sulphat.

3*d*.—Increase the dose to one ounce twice a-day.

5*th*.—Let him take his ball thrice a-day: there being as yet no visible alteration, excepting that the ulcers in the nose are spreading. Apply to them red precipitate powder.

9*th*.—The medicine is not producing any effect. A fresh ulcer is visible in the nose. Let him take two ounces morning and evening.

10*th*.—Some knotty tumefactions are to be felt upon his quarters, and his hind legs have taken to swell.

11*th*.—The ulceration inside the off nostril is rapidly spreading, though its appearance has been improved by the red precipitate. Two small ulcers, however, are now discoverable upon the *near* side of the septum. Continue balls.

13*th*.—The hind legs are so much swollen that exercise is deemed requisite. The appetite, however, continues good; and there is no perceptible loss of flesh. Augment the ball to three ounces of zinc twice a-day.

14*th*.—The disease keeps extending, but tardily. On this ac-

count the medicine was discontinued altogether, and the horse—after an interval—made the subject of a fresh experiment, the zinc having taken no effect whatever upon him.

SILVER.

THE only form in which silver is employed medicinally is in combination with nitric acid. The metal is, by solution in the diluted acid, converted into a salt denominated *nitrate of silver*; formerly known by the name of the *lapis infernalis*, nowadays commonly called *lunar caustic*.

From its instantaneous chemical action on the living fibre, forming with the albumen or fibrine contained therein a sort of caseous compound, and in this manner effecting complete destruction of the surfaces to which it is applied, without causing any very great pain, and with little or no risk of constitutional irritation following, lunar caustic, in the hands of the scientific surgeon, becomes a most valuable agent. By it, in numerous instances, has the bite of the rabid dog been rendered harmless; by it, many an irritable sore is changed into a healthy one, many an indolent into a healing one, many an excrescence and luxuriance eroded down to a proper level. In the hands of the veterinary surgeon lunar caustic is capable of also being made very serviceable. I have on occasions, by slightly touching the orifice of the wound with it, closed an open joint, and corrected intractable and boggy ulcerations. I have also succeeded in healing the chancres of glanders by it; and it is undoubtedly a very useful application in certain conditions of the broken farcy-bud. In solution—from a scruple even as far as a drachm to an ounce of distilled water—it makes an excellent collyrium in certain stages of conjunctival ophthalmia; and it is much more efficacious in this concentrated form than in the diluted state in which surgeons have been too much in the habit of employing it; the mucous membrane being capable of sustaining its action even better than the skin, in consequence of the coat of mucus upon it entering into chemical combination with the nitric acid of the silver, and thus disarming the caustic of much of its virulence. But lunar caustic is not so much used in veterinary medicine as it deserves

to be. It was formerly a very expensive preparation; and that, I believe, proved a formidable bar to its introduction into the veterinary pharmacy.

As an internal remedy lunar caustic has attained a good deal of celebrity in human medicine. In cases of epilepsy, chorea, and such like nervous disorders, surgeons have conferred benefit, amounting in some rare instances to cure, when all other medical means have proved abortive. There is, unfortunately, an objection to its long or continued use, which, by some medical men, is regarded of so serious a nature that they hardly dare resort to it at all—certainly not without forewarning their patients; and this is, that it has in several instances been known, after a long or continued exhibition, to cause discolouration—a sort of blueness—of the patient's skin, from some change it has apparently worked in the inter-cuticular tissue, the *rete mucosum*. I do not know that we have any reason to apprehend such discolourations being produced on our patients, or that it would signify much if such a thing were to happen. I have given the silver to one horse in considerable doses, and have persevered in it: with what effect will best appear from the case itself.

In the year 1818, a bay horse, five years old, was taken up from the strawyard in good condition in consequence of having the submaxillary glands on both sides in a state of tumefaction, and shewing ulceration of the membrane upon the septum in the off nostril. The case being regarded as one of pure sub-acute glanders, without any disturbance of the general health or appetite or spirits, and, having been desirous for some time back to give the lunar caustic a trial as an internal medicine, he was on the next day, the 23d of February, ordered to take argent. nitrat. gr. v, cum farinâ lini et theriac. morning and evening.

February 24*th.*—Double the dose morning and evening.

25*th.*—The near nostril has become ulcerated in a similar manner to the off. Let him take a scruple of the silver morning and evening.

26*th.*—Has not eaten so well as usual. Continue medicine.

27*th.*—Eats scarcely any hay, and his pulse has become accelerated. The excretions are regular. Continue the balls, and touch the ulcers with a weak solution of bi-chloride of mercury.

28*th.*—Appetite still indifferent. The nasal flux has a healthier aspect, and the ulcers have lost much of their foul character. Augment the dose to ℈iss morning and evening.

29*th.*—If any difference, his appetite has rather improved. Take ℈ij morning and evening, and have the ulcers dressed as before with the bichloride in a weak solution.

March 1*st.*—Failed in eating all his corn last night, but ate some hay: continue as yesterday.

2*d.*—He has almost recovered his wonted appetite, and his excretions remain of a normal character. The submaxillary tumefactions, from having been tense and fixed, have become loose and moveable. Let him take a drachm twice a-day.

3*d.*—His appetite is quite restored. The ulceration in the nose is stationary. Dress the ulcers with solut. cupri sulph., and let him take the ball *thrice* to-day.

4*th.*—Appears to have regained all his good health and spirits. ʒij twice a-day.

5*th.*—The ulceration has extended a little. Let him take the ball thrice a-day. At night he refused his food, and appeared ill from the medicine; but in the morning of the

6*th.*—He had again recovered himself; and so the ball was continued thrice in the day.

7*th.*—Medicine as yesterday.

8*th.*—ʒiij twice a-day. One of the submaxillary glands diminishing.

9*th*, 10*th*, 11*th*, 12*th.*—His appetite continuing very good, and there being no perceptible alteration in his excretions or in himself, indeed in any way, on each of these days he took the ʒiij twice.

13*th.*—The glanders is making progress, but not rapidly. Try one ball of ʒvj to-day; given in the morning.

14*th*, 15*th*, 16*th.*—The ʒvj ball was repeated each day.

17*th.*—The disease rapidly advancing. Let him take to-day ʒxij of the silver.

18*th.*—The large dose of yesterday took him a little off his feed; but there are no symptoms present to-day indicative of any serious disturbance; and, as the glanders is now hurrying into the acute and last stage, it was deemed, under all circumstances, useless to

push the experiment further, and, therefore, the patient was this day destroyed.

THE POST-MORTEM EXAMINATION disclosed nothing occasioned by the medicine, save a blush upon the villous membrane of the stomach.

ANTIMONY.

WE need feel no surprise that a mineral so abundant and cheap as antimony should from very early times have found its way into veterinary practice; nor, indeed, from its universally acknowledged utility in human medicine, that it should have met with a good amount of laudation as a veterinary remedy. The common or crude antimony—the *sesqui-sulphuret* of the present pharmacopœia—is readily disengaged by fusion from the ore, and comes to us in lumps or cakes of inky blackness, bespattered, like granite, with sparks of metallic brilliancy. In this rude form antimony has been administered to horses and cattle very extensively; with what success, however, to us, even at the present day, seems very doubtful. The following experiment may serve to shew what its real or perceptible operation is on horses.

Two horses having nasal gleets of a character so ambiguous as to create suspicion, were, in the year 1804, at the request of Professor Coleman, submitted by my father to the operation of antimony.

Sept. 12*th*, 13*th*, 14*th and* 15*th*.—Ounce doses of the antimony were given to each horse, morning and evening.

16*th*, 17*th*, 18*th and* 19*th*.—The ounce was administered thrice daily, without anywise affecting either of them.

From the 20*th* to the 25*th* inclusive, being the six following days, the horses took, each, two ounces thrice a-day, without effect.

On the 26*th* they commenced taking the enormous quantity of four ounces three times a-day, making to each three quarters of a pound daily; and these immense doses they continued receiving for seven successive days, there being evident during the time, copious diuresis, impairment of appetite, and loss of condition, and

this to such an extent that in the end both horses became greatly reduced in *embonpoint*. The medicine was now discontinued, and little length of time afterwards elapsed before both of them had in a great measure recovered their former condition. From Sept. 12th to October 2d, a period of one-and-twenty days, each horse had administered to him eight pounds and three quarters of antimony.

Of the preparations of antimony, all derived from the sesqui-sulphuret, the only ones retained in the present pharmacopœia are, the *oxy-sulphuret*, the *potassio-tartrate*, and the *antimonial* (or James's) *powder*.

OF THE OXY-SULPHURET OF ANTIMONY, the *precipitated sulphuret* of the former pharmacopœia, a preparation that has superseded in use the old favourite, *kermes mineral*, which is a hydro-sulphuret, I cannot say much about as a medicine. Indeed, I never exhibited it until pressed to do so by a gentleman—an amateur veterinarian—to whose solicitations I found myself compelled to submit. He presented me with a recipe for what he called *condition balls*, consisting of camphor, guaiacum, sulphur, and the oxy-sulphuret of antimony, which he assured me—and his assurances were of a nature that admitted of no sort of dispute—were most invaluable in their efficacy in promoting and sustaining horses' condition. And so I have given it, or rather seen it given, now for some years, but with what effect, the dose of the antimony being little more than a scruple, I am as much at a loss as ever I was to determine.

THE POTASSIO-TARTRATE OF ANTIMONY—the *emetic tartar* of the old, the *tartarized antimony* of the late pharmacopœia—is of immense importance as a medicine in the hands of the surgeon. By means of it, he vomits, nauseates, and sweats his patient, as well as in some measure succeeds in opening the bowels; and he has it in his power to regulate or divide his doses in that manner that he can produce these effects tardily or quickly, mildly or violently, according to the emergencies of his case. Its signal service in human medicine, its known prompt and violent action on the human stomach and intestines, and its influence on the skin as well, have naturally raised great expectations of its efficacy on animals. As far as horses are concerned—and farther I cannot myself speak—I am afraid these expectations have been disap-

pointed. Professor Coleman used to say, that emetic tartar took no effect whatever on horses, even in the largest doses. In spite of this denunciation, however, it has been, and continues to be, pretty generally used in veterinary medicine, though with what amount of benefit, or with what specific efficacy, it would, I have a notion, puzzle many of us to demonstratively point out. I have been myself for years in the habit of employing it as a febrifuge, and I now likewise prescribe it in pulmonic affections, in combination with nitre; and I really think I thereby cause, with the assistance of clothing, some augmented action of the excretions of the skin; and I know that I produce diuresis, and, after long continuance, also occasion some augmentation of the secretions of the mucous coat of the bowels. After all, however, this febrifuge medicine is never placed farther reliance upon by me than as an adjunct to measures of undisputed efficacy, or by itself as a *cooling* remedy, where naught but a little febrile disorder is to be overcome. I give it in doses of a drachm and two drachms, which, considering its administration to man in divisions of a grain, cannot be regarded as being very small. It is no legitimate argument that, because a horse in health may take an ounce, or even a pound, without harm, in a state of fever or other disease, he may not be susceptible of the operation of small doses frequently repeated; else how comes it that several persons have been known to take drachm doses with less effect than at another time even grains would have had upon them.

Of little palpable efficacy given internally, it seems strange that emetic tartar should take effect when applied upon the skin of a horse, much the same as it does upon the cutis of man. With an ointment containing no more than a drachm of antimony to an ounce of lard, the skin cannot be rubbed many times before it becomes pustulous, knotty to the feel, and tender, and ultimately scurfy, from the desiccation of the pustules. Bareness from loss of hair, and soreness, will follow, should the perfrications be persisted in. And the stronger the ointment, or the more frequent the perfrications, the sooner, of course, are these effects produced. In one instance I knew it produce vesication. According to some French accounts, in the human subject inungations of this kind have been known, through absorption into the constitution, to affect the

stomach and bowels, giving rise to nausea, vomiting, griping pains, &c. I cannot say I have ever seen much benefit arise from the use of antimonial ointment in the diseases of horses. I have made many trials of it for spavins, splents, and other tumours, but have generally found it superseded by a common blister. I think in chronic pulmonic inflammations it might, now and then, be used with some service upon the breast or sides. The hair should be shaved off to give it a fair chance of success; but this of itself often constitutes an objection to its use.

BARYTES.

BARYTA, or barytes, was introduced into this country in the latter part of the last century by Dr. Withering, who found it abounding in the lead-mines of the northern parts of England; and from him the mineral in its native state obtained the appellation of *Witherite*, it having been, before that time, known to the chemists of the continent by the name of *terra ponderosa* or heavy spar. It occurs naturally both in the state of *carbonate* and *sulphate*: in the former, however, in this country, more generally than in the latter.

Witherite, or the native carbonate of barytes, is used in pharmacy principally for the purpose of obtaining two barytic salts of comparatively high medicinal powers to any possessed by the carbonate itself,—the *nitrate* and the *chloride of barytes*, the latter only being admitted into the London Pharmacopœia. The former, however, besides being potently medicinal, is very useful as affording the readiest means of procuring *pure barytes*, a form in which it is virulently caustic, and, like unslacked lime, absorbs water with avidity, becoming then comparatively harmless. From the apparent success of some of my experiments on the efficacy of barytes as an antidote for farcy and glanders, I was induced to take the pains of preparing the mineral in its pure or caustic form for myself, and found the process by no means either a difficult or a tedious one. Sir H. Davy, by the force of his galvanic power, extracted from the pure barytes a metallic base, which he named *barium*; proving that what we regarded as "pure" was nothing beyond a metallic oxyde, or compound of oxygen and barium.

Carbonate of Barium.

Case I.—A brown mare has been in the infirmary for some weeks on account of an attack of farcy in the near hind leg, for which she has been treated in the ordinary way, having been latterly taking the farcy ball*. In spite of all that has been done, however, the disease has been of late making advances; and now, some tumefaction of the submaxillary gland, also, of the near side, has taken place, accompanied by a slight discharge from the correspondent nostril. The mare, notwithstanding, keeps in fair condition.

Sept. 30*th*, 1820.—The farcied limb much swollen below and to some extent above the hock—cords of tumefied lymphatics running along its inner side; painful, when handled, and causing excessive lameness; the submaxillary tumour is also painful to pressure. Her appetite, however, at present is good. Let her take, morning and evening, made into balls with linseed meal and treacle, carbonate of barytes ʒiij.

Oct. 1*st*.—Having refused part of her feed of corn this morning, the ball is omitted.

2*d*, 3*d*.—Reduce the dose to ʒij morning and evening, and let her walk out twice a-day.

4*th*.—The limb is more swollen. The inguinal glands have become tumefied. Both nostrils are discharging bloody matters occasionally, and both submaxillary glands are enlarged. She feeds well, however. Let her continue her two-drachm balls twice a-day, and her exercise.

5*th*, 6*th*, 7*th*, 8*th*, 9*th*, 10*th*.—Ball continued twice a-day.

11*th*, 12*th*, 13*th*.—Ball given thrice a-day.

14*th*, 15*th*, 16*th*, 17*th*, 18*th*, 19*th*.—ʒiij thrice a-day.

20*th*, 21*st*, 22*d*.—ℨss thrice a-day. No better.

23*d*.—Rather off her feed. Continue the ball in the evening.

24*th*, 25*th*, 26*th*, 27*th*, 28*th*, 29*th*.—Disease advancing. Continue her medicine.

30*th*, 31*st*, *Nov.* 1*st*, 2*d*, 3*d*.—Her appetite holds good, though farcy and glanders are consuming her.

* A composition of sulphate of copper, antimony, and common turpentine.

13*th.*—The mare was destroyed, suffering acute glanders to suffocation, in addition to having a limb frightfully affected in every part with farcy.

Chloride of Barium

Is the salt that has especially been used in human medicine; the one which, to the exclusion of all the others, is admitted into the last edition of our London Pharmacopeia under this in lieu of the old name, *muriate of barytes*. So potent is it, medicinally, that to human patients it is—like arsenic and bichloride of mercury, and other virulent poisons—commonly prescribed in the form of solution. To the horse it may be exhibited either in solution or substance.

Case II.—A brown gelding, eight years old, in fine condition, and—with the exception of his glanders—apparently in excellent health, shewing a discharge of a glutinous quality from the off nostril, with vesicles apparent upon the septum of the same side, such as betoken approaching ulceration, and tumefaction of the submaxillary lymphatic glands of the same side, which symptoms he has had for six weeks past, was submitted to the following trial of the above medicine.

June 26*th*, 1816.—Let him commence with a drachm of the chloride of barium, made into a ball with linseed meal and treacle.

27*th.*—He has refused his feed this morning. Omit his morning dose, but give him the ball in the evening:—ulceration in the place of the vesicles.

28*th.*—He has recovered his appetite. Continue the ball morning and evening. The discharge from the nose appears diminished.

29*th.*—Again off his feed this morning. Let him take the ball in the evening.

30*th.*—His appetite has returned. Give the ball twice a-day.

July 1*st.*—Ball morning and evening. Ulceration spreading.

2*d.*—Augment the dose to ʒiss twice a-day.

3*d.*—Again refused his morning feed, and his pulse has got quick: the discharge is not so copious, though the pituitary membrane has a blush upon it. Let him take the ball at night.

4*th.*—Feeds pretty well again, and is regular in his urinary and alvine evacuations. Rub the submaxillary swollen glands with infus. lyttæ, and give the ball morning and evening.

5*th.*—Give him ʒij of the salt morning and evening.

6*th.*—Augment his doses to ʒiij each.

7*th.*—Let the ʒiij be given again. It was too late discovered, after this morning's dose had been administered, that even last night the horse had refused his food; nor has he eaten any thing since. No symptoms, however, of alarming illness were manifested before noon to-day; then he was seized with dyspnœa, accelerated pulse, and other dangerous symptoms, which, in the course of the day, were succeeded by violent diarrhœa, painful and laborious respiration, and death.

Post-mortem.—The appearances upon the mucous membrane of the stomach and intestines—more intense upon the former than upon the latter—were such as are ordinarily produced by poisonous substances. The lungs were quite black, being to appearance in a state of mortification. The frontal sinus of the off side shewed its lining membrane greatly thickened, inflamed, and covered with a coating of purulent matter.

Case III.—A black gelding, seven years old, in good condition, was admitted on the 3d July, 1816, with an attack of farcy in the near hind leg. The lymphatics running up the thigh were corded, and in some places had broken out in ulceration. The submaxillary gland of the near side was tumefied, and there was a slight discharge from the near nostril, upon the septum facing which on the following day a small ulcer became visible. A "farcy-ball" was administered on the 4th, and that had taken him rather off his feeding.

July 5*th.*—Being in appetite pretty well again, he was ordered to take, morning and evening, barii chlorid. ʒss, cum farin. lini. et theriacâ.

6*th.*—Being to appearance a strong-constitutioned horse, and his appetite now excellent, he was ordered to take ʒiss of the chloride, morning and evening—to have his submaxillary glands blistered, and his farcy ulcers cauterized.

7*th.*—Augment the dose to ʒiij. This took him off his feed;

the evening ball had to be, in consequence, omitted. Two ulcers, of an indolent rather than active character, are visible upon the inferior part of the septum nasi, with appearances betokening the presence of others higher up upon it.

8*th*.—He feeds better. Let him take a drachm only, and that at night.

9*th*.—Feeds well again. The ulcerations upon the septum below have coalesced, and formed one large square ulcer. Let him take ʒiss of the salt, morning and evening.

10*th*.—He was again taken off his appetite last night, and had to omit the ball. Reduce the dose to ʒi.

11*th*.—His appetite has failed again. Omit the medicine this morning, but give the ball in the evening.

12*th*.—His appetite is renewed; the evacuations are regular; the ulcer in the nose seems dried up on its surface, and the farcied limb is making progress towards recovery.

13*th*, 14*th*, 15*th*.—He has continued his drachm doses up to this morning; now, being off his appetite, the ball is remitted till night.

16*th*, 17*th*.—Continue medicine.

18*th*, 19*th*.—Augment the dose to ʒiss. This again took him off his feed this morning. The ulcer in the nose exhibits a perfectly dry even surface, though a bloodless one. The farcy is disappearing: to-night the ball is omitted.

26*th*.—No medicine has been given since the morning of the 19th. Nought but a white cicatrix remains, where the ulcer was, upon the septum nasi; and the farcy ulcers are quite healed, and skinned over. The horse is, in fact, recovered, and is therefore discharged: with an injunction, however, that he be kept for some length of time to come apart from other horses. Afterwards he was sold, and so escaped my future observation.

Case IV.—A large bay coach-horse, 24 or 25 years of age, in low condition, was admitted into the infirmary on the 24th July, 1816, for a general attack of farcy, which has terminated in glanders, now of the sub-acute character; however, there is fœtor from both nostrils: the odour from the off one is quite offensive, there being upon this side of the septum nasi an ulcer apparent.

Both sets of submaxillary glands are swollen. Let him take of the muriate of barytes 3ss morning and evening.

July 25*th*.—His appetite is indifferent. Continue the ball.

26*th*, 27*th*, 28*th*.—Both his appetite and spirits have amended under the operation of the medicine, which he has been taking regularly twice a-day. Farcy-buds are now apparent upon his thighs, hips, neck, and fore-legs: in fact, hardly any part is totally free from them.

29*th*, 30*th*, 31*st*.—The dose has been augmented half-a-drachm, morning and evening, and this for the last two days has affected his appetite. Many of the farcy-buds are now in a state of suppuration. The ulceration in the nose has a cleaner aspect.

August 1*st*.—Omit the ball this morning; apply the budding-iron to his farcy sores, and blister his submaxillary tumours.

2*d*.—The ball given last night has again caused him to loathe his food. Remit the medicine until night.

3*d*, 4*th*, 5*th*, 6*th*, 7*th*.—Until the 7th—on which day the ball was remitted until the evening, from his appetite becoming defective—the medicine has been regularly administered in 3ss doses, morning and evening. The farcy has not been making any fresh incursions; and as for the ulceration in the nose, it certainly appears upon the surface disposed to become dry and scab over. The discharge from the nose also is diminished.

9*th*.—Omit the medicine to-day, on account of the want of appetite.

10*th*, 11*th*.—Ulceration in the nose and appearances of farcy elsewhere *in statu quo*—certainly making no progress.

14*th*.—The owner feeling disheartened at the fluctuations from day to day, and requiring such assurances from us as we felt we could not give him, ordered his horse for slaughter.

Post-mortem.—There was no appearance of disease in the sinuses of the head; its attack proved confined to the nose, indeed almost to the off side. The lungs proved to be sound; a remarkable circumstance, considering the animal's great age.

Case V.—A brown mare, seven years old, was admitted on the 26th May, 1817, with symptoms of febrile catarrh. She lost her febrile disorder; but continued running at the nose so long, that,

on the 21st of June following, it was deemed prudent to remove her out of her present box into a foul one. The discharge, which is of a thin mucous character, continues from both nostrils, neither copious nor particularly unhealthy. Within the off side of the nose one ulcer is to be seen, and within the near, two: and the schneiderian membrane has a blush upon its surface. There is also a swelling underneath the jaw, which has been blistered, and thereby brought to a state of suppuration, for which it has been opened. The case is not without suspicion, and yet it has not altogether the character of glanders. Indeed, the suppuration of the submaxillary gland is, as far as that goes, evidence that it is not one of glanders.

June 23*d*.—Ordinary treatment having failed, it was resolved this morning to make trial of the chloride of barium. Let her take a drachm made into a ball with linseed meal and treacle morning and evening.

24*th*, 25*th*, 26*th*, 27*th*.—The appetite continues good, notwithstanding she has regularly taken her medicine.

28*th*.—A fresh vesicle has this morning made its appearance in the inside part of the off nostril. The discharge is thicker—more purulent in its character: continue ball morning and evening.

29*th*.—The vesicle has burst, leaving moisture and rawness of surface. The appetite continues so good that we venture on giving her ball thrice a-day.

30*th* .. } The discharge is diminished, and the ulcers appear
July 1*st* } disposed to heal.

2*d*.—Fresh ulcerative action is set up in the place where the vesicle arose. The glands under the jaw continue swollen, but feel loose. Let her take ʒij morning and evening.

3*d*, 4*th*, 5*th*.—She has regularly taken her balls. The ulcerations in the nose are assuming a white aspect.

6*th*.—Has left part of her morning's feed. Omit the ball until evening. Discharge becomes scanty and principally mucous.

8*th*.—She took her medicine twice yesterday, and it has thrown her off her appetite to-day. There is not any issue from the nose; and where the ulcers were, the places have the aspect of white cicatrices.

10*th*.—In consequence of a return of the nasal flux, and her

appetite becoming repaired, the ball, reduced to a drachm, is given her again twice a-day.

11*th*, 12*th*, 13*th*, 14*th*.—She has regularly taken her balls, and under their administration the discharge from the nose has again ceased. The ulcers appear quite healed up; the submaxillary glands, however, continue enlarged.

15*th*, 16*th*, 17*th*, 18*th*, 19*th*.—The medicine in diminished doses of ʒiss each has been regularly given twice a-day; and she has fed well. The nose is free from issue—and the glands, since last report, have been blistered.

20*th*, 21*st*, 22*d*, 23*d*.—The dose, morning and evening, augmented to ʒij. She has not failed in her appetite until this last morning.

In this manner—diminishing and again augmenting the dose according as she would bear it—the administration of the medicine was persevered in until the 30th of August; altogether, nearly ten weeks. The result was, the mare left the infirmary, to every outward appearance, "cured" or recovered of her disease. Whether her disease was glanders or not, I shall leave to others to determine. The nasal discharges were never put *to the test* of inoculation. I shall select one other case in which the chloride was given; and it shall be one in which it proved fatal. It will serve to shew in what a sudden and unexpected manner death occasionally happens during the exhibition of this poisonous mineral.

Case VI.—A bay horse, admitted on the 8th of March, 1820, with symptoms, not altogether decidedly marked, of glanders and farcy. He was, when I examined him on the 20th of the same month, low in condition, and appeared debilitated either from the disease, or what had been done for it. I found ulcerations within both chambers of the nose; but they were, although unhealthy in character, of an inactive or chronic description. There was a viscous yellow issue from both nostrils, also tumefactions of the submaxillary glands of both sides. Both hind limbs were swollen as high as the thighs, and exhibited cords of tumefied lymphatics upon their inner parts. There also was present a swelling, most unusually hard to the feel, of the sheath, which ran for some way along the abdomen.

In this case I resolved to try the medicine *in solution*. I therefore ordered the horse to be kept short of drink, and to have mixed in his pailful of water a fluid-ounce of the LIQUOR BARII CHLORIDI, and this to be done morning and evening, keeping him without water at mid-day.

23*d*, 24*th*, 25*th*, 26*th*.—He drinks his water—has had ℥iss of the solution mixed with it, morning and evening.

27*th*, 28*th*, 29*th*, 30*th*, 31*st*, *April* 1*st*, 2*d*.—Has drunk ℥ij morning and evening in his water, and has been regularly exercised. There appears less discharge from the nose, and of a better character. The hind limbs are less swollen.

April 3*d*.—He purges, and has failed in his appetite. The ulcers have certainly a cleaner aspect, and the submaxillary glands have in some measure diminished.

4*th*, 5*th*, 6*th*, 7*th*, 8*th*.—Continue medicine as before.

9*th*.—Purges again, and very much off his feed. His farcy has undergone amendment: but, in respect to the nasal affection, that seems one day better, another day worse.

11*th*, 12*th*, 13*th*, 14*th*.—Recovered his appetite, and has continued his medicine.

15*th*.—This morning the groom had exercised him as usual, and on his return had tied him up in his box. Five minutes afterwards, he found the patient had in his absence dropped down dead.

Post-mortem.—The lungs were sound—the right lobes full of blood, from lying upon that side—the vascular lining of the stomach certainly redder than usual, and yet presenting nothing amounting to inflammation produced by poisoning—the intestines and other viscera healthy—the membrane covering the septum nasi and turbinated bones having the worm-eaten aspect denoting chronic ulceration. Both frontal sinuses contained white purulent-like matter, but presented no ulceration.

The fatal operation of the medicine appears to have been on the nervous system. In substance it affected the alimentary mucous membrane differently from what it did in solution. In the latter form it dangerously insinuated itself into the system.

Pure or Caustic Barytes—Oxyde of Barium.

Case VII.—The apparent success attending its administration in Cases III and V, inspired me with a great desire to exhibit barytes in a form unmodified by any combination; and from that circumstance more likely—as I imagined—to turn out more efficacious. I at first procured what was called *the pure barytes* from the chemist, enclosed in air-tight bottles: finding it, however, expensive (3s. 6d. per ounce), and, from some differences observable in its operation, doubting in some instances its purity, I at length essayed to prepare it for myself, and ultimately succeeded completely to my mind.

About this time, 1818, Col. Quist, then in great celebrity as superintendent of the riding department of the Ordnance at Woolwich, possessed an old* white horse, a great favourite in his school, that had for some two or three weeks been ailing, and had been treated for his complaints by the Colonel himself. Finding, however, that affairs grew worse instead of better, he at length consulted my father concerning the old horse.

July 18*th.*—An albuminous, purulent, gluey discharge, having an offensive odour, issues from the near nostril; purulent matter is also visible upon the *septum nasi*, with such appearances altogether as to lead to the belief that—although no ulcers are apparent—some exist in situations higher up, where they cannot be seen. The submaxillary gland of the same side is swollen, and hard to the feel; the opposite side of the head free from discharge; no farcy; the animal's appetite and spirits are good; and his condition to all appearance healthy. Let him take half a scruple of the pure barytes the moment after it is made into a ball.

19*th.*—Let his dose be doubled.

23*d.*—The scruple dose has been administered daily without any discoverable effect. Let him commence to-day taking it morning and evening, his appetite continuing very good. In the course of the day there has come on suddenly a profuse discharge of purulent matter, mingled in part with blood, from the diseased side of the nose, attended with a great deal of stench.

* Said to have seen twenty-five summers.

31*st*.—There has been some occasional slight failures of the appetite, but not sufficient to induce me to suspend the medicine. There has also been for the last day or two some appearances of discharge issuing from the other nostril; and this morning the flux is as abundant from one side as the other, and its offensiveness continues.

August 4*th*.—Has failed in his appetite, and in the evening threw out blood again from his nose.

5*th*.—This morning, early, I was called to him for being "griped." I found him expressing a great deal of anxiety and pain, pawing occasionally, and from time to time casting woful looks at his flank. I ordered him a sedative (laudanum) draught; and had it repeated at intervals of two hours. It relieved him temporarily. At half past eleven o'clock, A.M., however, he died.

Post-mortem.—More marked signs of inflammation in the mucous linings of the intestines than in that of the stomach. Lungs in a state of tuberculous disease throughout their substance. The near proved the only side of the head affected with the disease, which, from the first, was evidently glanders. The near frontal sinus exhibited a great deal of ulceration, and contained a fœtid purulent matter of the same character as what had run from the nose. Within the maxillary sinus was found a considerable effusion of lymph floating in the contained purulent matter. From such an inveterate case as this I could not have expected any good result, even had not the medicine proved suddenly fatal; and, therefore, I still entertained the same desire to give the barytes in its pure form a fair trial.

CASE VIII.—In order that the experiment might be of a kind the least subject to objection, a horse, healthy in every respect save lameness from navicular disease, and but seven years old, was made the subject of it. He was accordingly inoculated for glanders with matter which I had taken great pains myself to procure from Cow Cross, taking it from a horse standing for slaughter in the yard, whose disease—glanders—appeared of the most acute and malignant description. The inoculation was performed inside the near nostril on the 11th of September 1818. On the 14th there was some oozing from the nostril, and the submaxillary gland upon the same side was swollen. On the 15th,

ulceration appeared upon the near side of the *septum nasi*, and there was more discharge.

16*th.*—There now exist two large unhealthy-looking ulcerations upon the inferior portion of the septum nasi, accompanied by a flux, confined to that (the near) side, of muco-purulent matter, adhering in places about the external *nares*. The gland has increased in magnitude since yesterday; and there has risen up a cord of swollen lymphatics, about as large as one's wrist, running from the gland along the submaxillary space. Let him commence taking a scruple of the pure barytes, daily. Neither his spirits nor his appetite have undergone any visible impairment.

18*th.*—No perceptible alteration. Give the ball twice a-day.

19*th.*—Baryt. pur. ℈iss, morning and evening: the ulcerations growing very deep and unhealthy. This augmented dose was given about 10 o'clock, A.M. At 1 o'clock, P.M. symptoms evincing pain in the bowels made their appearance. The animal frequently lay down and rolled, and threw himself about, and then broke out into a profuse perspiration; the commotion having come on immediately after drinking about a quart of cold water. A draught of a pint and a half of common vinegar, to which some laudanum was added, gave immediate relief.

21*st.*—My patient being to appearances quite recovered of his bowel attack, this morning he resumed his medicine in the dose of a scruple.

22*d.*—Farcy has attacked the near side of the face. It has proceeded from the cord of tumefied lymphatics which was observed and recorded on the 16th. This progress of disease induces me to venture on the exhibition of the ball thrice a-day.

25*th.*—Dose augmented to gr. xxv, thrice a-day.

27*th and* 28*th.*—Gr. xxx, thrice a-day.

Conceiving that the barytes—although administered as soon as made with meal and treacle into ball—must have its medicinal virtues more or less diminished, I had it inclosed in paper tubes, and thus inserted into the middle of the balls, without any chance, prior to administration, of its coming into contact with moisture.

Oct. 11*th.*—The balls, containing the paper tubes filled with the thirty grains of barytes, have been regularly administered since last report, and the result to-day is, that great amendment is

visible. The farcical and corded submaxillary tumefactions have disappeared; and there is evident healing action going on in the ulcerations upon the septum.

18*th*.—Ulcerations no longer exist in the nose: they are all healed, the *cicatrices* indicating the places they occupied alone remaining. A farcy-bud which had broken upon the side of the face has likewise healed up, without having had any dressing whatever. For the last three days the ball has been given but once daily.

26*th*.—Since the 19th ult., our stock of pure barytes having on that day been exhausted, the horse has been taking the chloride of barium in a state of solution, mixed with his water. He is now—has been, in fact, since last report—perfectly recovered.

Case IX.—Too much flattered by the result of the experiment made in Case VIII, and some other fortunate terminations, I commissioned a person to make a purchase for me of the first glandered horse he saw in Smithfield market likely to afford me a fair chance of recovery. Accordingly, on the 11th of June, 1819, I had a mare sent me from London, standing sixteen hands high, about eight or nine years old, and in very tolerable condition, at a cost of £4..10*s*. Her general aspect is that of healthy working condition; her coat lies smooth upon her, and her spirits and appetite both appear unimpaired. A plentiful flux of straw-coloured seropurulent matter is issuing from her off nostril, and within the corresponding chamber upon the septum are discoverable three foul ragged ulcerations. The submaxillary gland of the same side of the head has become considerably enlarged, and it is so tender to pressure that the mare flinches when it is merely felt with the fingers. The enlargement is not fixed to the side of the jaw-bone, but to the fingers imparts the sensation of consisting of lobules, and depends a little below the margin of the jaw. Her near hind leg is also swollen from the hock down to the hoof. The swelling has a hard feel, and when it is compressed with the fingers she catches the limb up as if the pressure, though but slight, occasioned pain. I examined the groin, but could detect no swelling there, and yet she seems to dislike—perhaps from natural ticklishness—to have it handled. There is certainly some appearance like a corded lymphatic just above the hock, upon the inner side, and

this circumstance would induce me to look upon the tumefaction altogether as farcy: still there is in my mind a doubt.

June 13*th.*—Let her commence with a scruple of barytes morning and evening.

16*th.*—She has regularly taken her ball twice a-day, and has been exercised daily. For we found that while standing in her box her hind leg increased in size, and the swelling ran upwards more. To-day the ball is to be administered thrice.

21*st.*—At times we feel inclined to think she has experienced some amendment: the following day, however, serves, commonly, to dissipate all such too fond imaginations. Since her appetite continues very good, and she manifests no evidence of the medicine taking any effect upon her, let her now take a dose of a scruple and a half, but only *twice* a-day.

24*th.*—Let her take her augmented dose thrice a-day.

30*th.*—Since the last report the nasal discharge has been diminishing, and the ulcerations have put on a less unwholesome aspect. The limb, also, has been decreasing in size: to-day, however, there is evident remission of the symptoms, and, therefore, I augment the dose to a drachm, and give it thrice a-day.

July 7*th.*—Our barytes obtained from the druggist's is thought to have lost its virtues. The remainder of our stock is consequently returned to be exchanged for another—fresher—preparation. In the mean time I prescribe the chloride, to be mixed with her water.

10*th.*—Having received a fresh supply of the caustic barytes, half-a-drachm is prescribed to be given morning and evening.

19*th.*—Since the 12th, the drachm dose has been repeated in the evening. To-day the doses are doubled. The ulcerations one day appear cleaner, another almost as foul as ever—the limb is remaining much *in statu quo.*

23*d.*—The dose this morning consisted of the last four drachms of our stock of barytes. No sensible effect has been taken by the medicine; nor has it proved anywise beneficial as concerns the disease. Here, therefore, our experiment with the pure barytes may be said to end.

Not knowing what to do with the mare, confirmedly glandered as she is—not liking to send her away for slaughter—I determined

on destroying her, if possible, with some carbonate of barytes we still had in our pharmacy.

24*th.*—Accordingly, I commenced giving her two drachms of the carbonate this day, repeating the dose in the evening.

26*th.*—Three drachms morning and evening.

27*th.*—Four drachms morning and evening—Disease spreading within the nose.

28*th.*—Five drachms, morning and evening.

29*th*, 30*th*—Six drachms, morning and evening.

31*st.*—One ounce of the carbonate twice a-day: her appetite continues good.

Aug. 1*st.*—Nine drachms, morning and evening.

2*d.*—Ten drachms, morning and evening. She falls away, I think, in her condition; yet she feeds and looks well.

8*th.*—A drachm has been added daily to every dose of her medicine. She has seemed all along unaffected by it. Being forced to go to London, and not returning until the 10th of the month, I found she had died quite suddenly the day before.

Post-mortem.—The disease proved the genuine chronic form of glanders: the membrane lining the sinuses of the head and nasal chambers exhibited the true miliary ulceration. There also existed ulceration of the cartilages of the larynx. The lungs contained tubercles.

Manganese.

The metallic substance, vulgarly known as the Black Oxide of Manganese, and which has of late received the stricter chemical appellation of *Binoxide*, was, by way of experiment, administered by me to a horse so long back as 1813.

On the 7th of February of that year, a bay horse, five years old, rather low in condition, was admitted into the infirmary on account of ulceration appearing in his off nostril, accompanied by tumefaction of the submaxillary lymphatic gland of the same side. There was, however, no appearance of farcy, nor any very evident derangement of his health. He fed well, and was in good spirits, and his bowels acted regularly. Let him take half an ounce of the binoxide of manganese, made into a ball with treacle, daily.

8*th.*—Give him the ball twice to-day.

9*th.*—Let him take the ball thrice, it having no effect.

10*th.*—Make the dose an ounce, and give it thrice a-day.

11*th.*—He has refused his corn; so give the ball but twice.

12*th.*—During the past night he has eaten scarcely any thing, according to the man's report: this morning, however, he appears to have regained his appetite. Reduce the dose to half an ounce, and let him take it twice to-day. At night his pulse had risen to 55, and was beating with considerable force: there was also some increase of respiration.

13*th.*—His dung falls *en masse*, and his appetite is delicate. Reduce the dose to two drachms twice a-day.

14*th.*—Diarrhœa has set in, and his appetite has failed, and his pulse is 60. Discontinue the medicine.

15*th.*—His fever has abated, and he has much recovered his appetite and spirits. The purgation has also ceased. Let him take, morning and evening, ʒij of the binoxide in combination with a scruple of opium, and rub some infus. lyttæ upon his tumefied glands under the throat.

17*th.*—This prescription seems to agree very well with him. But the ulceration within the nose has sadly spread over and eroded the membrane: indeed, in places the septal cartilage is laid bare through it. An injection of a solution of bichloride of mercury has been used, and seems to have the effect of smoothing down the sharp jagged edges of the ulcers.

18*th.*—His nose has taken to swell, seemingly in consequence of the injection. Let a fomentation be used to it.

19*th.*—He has quite recovered his appetite, but in point of disease is growing worse daily. Let him take the two drachms twice a-day, and have his nose syringed with a weak solution of sulphate of copper.

22*d.*—Increase his dose to three drachms twice a-day. Ulceration has appeared in the left nostril, and the correspondent lymphatic gland is swollen.

24*th.*—Give five drachms of manganese twice a-day. Upon the off side the septal cartilage is laid quite bare from ulceration, and on the near side the membrane is rapidly being consumed. On both sides exist considerable enlargements of the submaxillary glands.

It not being thought worth while to push the medicine further the horse was shot.

On the 7th of March of the same year (1813) a horse was admitted into the infirmary for an attack of periodic ophthalmia in the near eye. The eye, it appears, has been "weak" for three or four days. At present the lids are closed, the light being too much to be borne; and when they are separated by force, the cornea is found too muddy to admit of any observation of the state of the internal parts. Some blood was drawn from the angular vein, and half an ounce of the binoxide of manganese given twice a-day, nothing being used to the eye.

On the 12th the eye was better; and, as the patient had nowise lost his appetite, the half-ounce ball was ordered thrice a-day.

On the 13th, the dose was doubled; and on the 14th it was again doubled, making two ounces taken thrice a-day. This was persevered in up to the 18th; on which day, and the day following (the 19th), the enormous doses of ℥iv were given three times, making twenty-four ounces in the two days, without taking any perceptible effect.

Why the former horse should have been affected by the manganese in much smaller doses, I could assign no other reason than that of his system being contaminated by the virus of glanders.

SULPHUR.

SULPHUR—commonly called *Brimstone*—one of the earliest-used substances in medicine, has always enjoyed, and continues to enjoy, considerable reputation, both in human and veterinary pharmacy, and no less as an external than as an internal remedy. In man, it is said to loosen the belly and promote the insensible perspiration; indeed, so to permeate the system as actually to transpire through the pores of the skin in the form of the vapour of hydro-sulphuric acid, tainting not only the sweat, but the urine and other secretions as well, and having a stimulant operation also upon the mucous membranes of the body upon the membrane of the rectum, and upon the bronchial membrane; which accounts for the good sulphur has in times heretofore been said to have

worked in pulmonary affections: indeed, so beneficial was considered to be its power over asthmatic and similar disorders, that it was called, by way of eminence, "the BALSAM of the lungs." And since, says Solleysell, "sulphur is the balsam of the lungs, the *tincture* must certainly be a very effectual remedy in this case." For the making of which valuable "tincture" Solleysell gives very full and particular directions; adding, that if such gentlemen as may "complain of the tediousness of the preparation can find a remedy to cure their horses with less trouble," he "promises them not to be offended at the happiness of their invention*."

SUBLIMED SULPHUR was administered by my father, in conjunction with Professor Coleman, to three horses at the same time, with a view of ascertaining its medicinal properties, in ounce doses, for four days, without any visible alteration in either of them. During the four following days their doses were doubled, and yet no effect produced. For the five successive days each horse took four ounces daily, and still no effect—not even a laxative operation. One of the horses, while taking the sulphur, passed a number of long white worms (*lumbrici*, probably): how far the sulphur might have promoted their discharge, my father, from this single case, could offer no opinion.

If horses can take four ounces of the flowers of sulphur a-day without effect, the quantity we are in the habit in our practice of giving, one would think, cannot do much good nor any harm. My own formula for diuretic mass is a compound of sulphur and common turpentine: I have never, however, attributed much if any virtue to the former ingredient, but rather regarded it as a vehicle for the latter; and the two amalgamate very well.

AMMONIA.

AMMONIA appears to be made more use of in veterinary medicine as an *external* than as an *internal* remedy. The *liquor* or *aqua ammoniæ*, from its known property of forming a kind of soap in

* The Compleat Horseman, Part II, page 191. Hope's Translation, 2d edit.

combination with oil or fat, is found useful in our hands, as well as in surgeons', as a stimulant and rubefacient. I once, and but once, administered it to a horse inwardly.

May 15*th*, 1813.—A bay horse, eight years old, in good condition, though affected with sub-acute glanders, took an ounce of the *liquor* in a pint of water; and the same dose was repeated in the evening.

16*th*.—The same doses were repeated.

17*th*.—The drench has caused excoriation underneath the tongue, and the horse, apparently on that account, refuses his food. Wash the excoriated part with a solution of alum, and give the drench again.

18*th*.—The mouth is rendered too sore to continue the drenches. Let him take an ounce of the hydrochlorate of ammonia, in ball, twice a-day, and dress his mouth as before.

19*th*.—His appetite has improved. Give two ounces of the hydrochlorate morning and evening.

20*th and* 21*st*.—Balls continued twice a-day.

22*d*.—No visible effect produced.

June 1823.—Professor Coleman informed me that four ounces of carbonate of ammonia had been given to a horse in the Veterinary College, and had not been followed by any result.

NITROUS ACID—*(Acidum Nitrosum)*.

FROM the reputation which this acid many years ago enjoyed as a remedy for the venereal disease, I felt desirous to make trial of it in glanders. In May 1813, a horse was taken out of the straw-yard into the Royal Horse Infirmary, at Woolwich, on account of an attack of sub-acute glanders. There were ulcers visible upon the near side of the septum nasi, and from the near nostril there issued a gluey discharge, accompanied by tumefaction of the sub-maxillary lymphatic gland of the same side; the off chamber of the nose and off glands being in their normal state. The horse feeds, and appears otherwise in health.

May 1*st*.—Let him take half an ounce of nitrous acid in a pint of water, morning and evening.

3*d*.—The drench has rendered his mouth and throat sore, and cannot, on that account, be repeated.

Afterwards, a sort of ointment was formed by triturating the acid with lard, and then making the mixture into balls with linseed meal, and thus administering it. Its decomposition, however, by the fat would necessarily impair or alter its medicinal properties; it was for this reason, perhaps, that, notwithstanding the balls were continued for some length of time, no perceptible effect was produced, neither did the animal appear to suffer any inconvenience from their exhibition.

PRUSSIC ACID—(*Acidum Hydrocyanicum*).

In July 1821, a time when there was a good deal of talk about the extraordinary effects of this acid, the following experiment was made:—

A female ass, three weeks old, that had been procured for the purposes of dissection, had half-a-drachm of prussic acid poured upon its tongue, near to the tip. Immediately afterwards, the respiration became accelerated, the pulse quickly ran up to 150, and the animal evidently felt vertiginous; for, in endeavouring to walk she reeled so from one side to the other, that every person present expected she must fall at every next step she took. Instead, however, of falling she gradually acquired a steadier and firmer step, and, to our surprise, had, five minutes after the experiment was made, so far recovered herself that it was manifest our object—that of destroying life—had been frustrated.

Waiting another five minutes, to give time for more complete recovery from the effects of the first half-drachm, a drachm (by measure) of the acid was poured upon the same—the pointed—part of the tongue. The effect was equally immediate as, but more violent than, that of the half-drachm. The respiration was to the utmost degree hurried; and ere we could manage to count or conjecture what the accelerated state of the pulse amounted to, the ass, staggering alarmingly at the time, suddenly fell with violence against the table in the room. Convulsive struggles followed the fall, but these gradually diminished, and were ultimately succeeded by

a state of coma. The respiration, which but now had been hurried and laboured, became comparatively languid, slow, and deeply fetched; the pulse underwent the same change; the condition of the animal altogether reminded me much of the effects I had witnessed on a former occasion from the introduction of caustic barytes underneath the skin. Life, thus half extinguished, continued for the space of about three minutes longer, and then, imperceptibly to us, departed.

VINEGAR—(*Acetum*).

In November 1823, a veterinary friend of mine, whose name is of no consequence in this account, assured me, on my telling him that I knew not, myself, of any medicine having a direct or positive diaphoretic effect upon horses, that common vinegar, given warm, would produce such an effect.

In the February following, to a chestnut horse having chronic glanders—shewing no disordered health—a pint and a half of common household vinegar, made warm, was administered as a drench, and, at the same time, two thick woollen sheets and a hood were put on him. The thermometer in his box stood at 45°. No effect followed.

The next day a quart of vinegar was exhibited, under similar circumstances. This was given cold. Still no result.

SULPHATE OF MAGNESIA—(*Magnesiæ Sulphas*).

So universally used and extensively useful as *Epsom salts* (as this substance is commonly called) is in human medicine, it was natural for the farriers of old to have recourse to them in horse and cattle medicine; and though, as far as the horse is concerned, they have been found, as a cathartic at least, to be powerless, they have turned out to be, to neat cattle, the best purgative at present known. To an ox or a cow, a pound of sulphate of magnesia dissolved in water constitutes the ordinary cathartic; but such a dose administered to a horse has no effect on the bowels whatever. In April 1822, with a view of testing the medicinal power of this

neutral salt, I gave a horse—having glanders—belonging to Captain Saunders, of the Royal Artillery, twelve ounces dissolved in water. The drench, however, produced no effect.

In October of the same year, to a glandered carriage-horse, prepared by dieting, a pound of the salt dissolved in a pint and a half of water was given: without, however, any result.

SULPHATE OF SODA—(*Sodæ Sulphas*).

Of this (which goes also by the name of Glauber's salt) large doses had been given, without effect, to a horse condemned on account of being glandered. Subsequently to which castor oil had also been given, in large doses, to the same horse without any very marked impression.

It was at length suggested, either by Mr. Coleman or my father —the record before me does not state which—that the salt and the oil should be exhibited in combination to the same horse. Accordingly, on the morning of ——, a pound of Glauber's salt dissolved in a pint of water was mingled with a quart of castor oil; and this (rather unchemical) mixture was administered as a drench. On the evening of the day of its administration no effect had been produced. Next morning the same dose was repeated. At the evening stable hour the horse's bowels were found to be slightly moved; a laxative operation had evidently been produced. This was followed by symptoms of nausea; the animal loathed his food, and appeared inwardly very unwell. To this succeeded violent diarrhœa, which, on the third day from the exhibition of the drench, terminated in the animal's death.

For my own part, I have no notion that the sulphate of soda added much, if any thing, to the efficacy of this fatal cathartic: I believe that the large doses of the oil given on successive days did the mischief; and I think this will appear from an experiment I am now about to relate:—

CASTOR OIL—(*Ol. Ricini*).

Dissatisfied with the accounts I found recorded of the effects of castor oil on horses, in March, 1822, I made the following

experiment:—To a horse, under treatment for lameness, who had all the preceding day been fed on bran-mashes, by way of preparation, at ten o'clock, A.M., was exhibited, as a drench, a bottleful (a pound and a half) of castor oil. During the day the horse was twice taken out for exercise. At five o'clock, P.M., purgation commenced, and the catharsis continued during the whole of the following day. Indeed, the effect proved fully equivalent to what an ounce of aloes would have produced.

November 5th, 1822.—The same (glandered) horse who had been made the subject of experiment in testing the effects of Epsom salts took this morning the same dose (℔iss) of castor oil as had been administered in the last case, of which not above half-an-ounce was wasted. At six o'clock the same evening his dung, which had been hitherto falling in balls, was observed to fall in divided portions, as though preparatory to purgation. On the morning of the 6th, however, no purgative effect had followed; neither had there been observed any sign of nausea, dispiritedness, or disinclination for food.—*7th*, as usual. No result whatever could be detected.

April 23d, 1822.—At half-past nine o'clock in the morning a pint of castor oil was given to a large bay horse, standing in the infirmary on account of an incurable farcinous affection of the near hind limb; he having been prepared for the dose by a bran-mash over night and the withdrawal of his hay. After taking his oil he was, in the course of the day, thrice walked about for exercise. At eight o'clock P.M. he had shewn no signs of purging, but he exhibited dulness and languor and impairment of appetite, and some augmentation of pulse. At seven o'clock at night these symptoms had become more manifest, and his pulse now was 70. At ten o'clock P.M. we found him standing "all of a heap," with his back roached, hind limbs advanced underneath his body, and his abdomen sensibly contracted and tense, indicative of pain, although such was not, further than this, actually expressed.

24th.—He has not eaten much during the night, but this morning has drunk two pails-ful of (chilled) water. Does not purge, but still stands in the crouching position he did last night; his belly continues tense and drawn up; and when walked out, he moves his

limbs as though cramp or rheumatism had seized them all. All this makes us think the animal must be suffering a good deal of inward uneasiness—not to say, pain—although, as yet, he has evinced nothing of the nature of "gripes." In the course of the afternoon he was found lying down, with his body and limbs stretched out, and occasionally grunting. He has eaten very little to-day, but drinks freely. Let him have a purgative enema every two hours. At seven o'clock P.M. still lying, and now with his legs drawn together towards his abdomen. He appears very uneasy: he is making occasional efforts to rise and then falls down again, as though he had not the power of erecting his body. At length, however, he accomplished it; and no sooner was upon his legs than he passed a copious liquid evacuation—the first purgation he had had. This evidently afforded him great relief; for immediately afterwards he took to feeding. At nine o'clock P.M., however, he was again lying down, and, to appearances, had become as uneasy as before, with a pulse strongly beating, though no more than 50. Let him lose ℔viij of blood, and have a blister put upon his belly. The blood-letting relieved him, and (about ten o'clock P.M.) we left him for the night. Further detail is unnecessary. In the end the horse recovered from the effects of the castor oil; but they were such as to deter me from giving it remedially. Indeed, it is this case that induces me to believe that the fatal consequences occasioned by the exhibition of sulphate of soda and castor oil together were principally —entirely, perhaps—to be ascribed to the castor oil.

THE ALOE.

(Aloë Spicata vel Capensis, Vulgaris vel Barbadensis.)

THERE exists no production, either of the mineral or vegetable kingdom, more extensively used in veterinary medicine, neither is there any that, judiciously prescribed, is capable of conferring a greater amount of benefit in the hippiatric department, than the extracted and inspissated juice of the aloe plant. Were the veterinary surgeon by any accident deprived of aloes—his or-

dinary and all but universal cathartic for horses—it would puzzle him not a little to devise a substitute for them. Almost the entire class of cathartic substances in use in human medicine become powerless administered to horses: salts, senna, rhubarb, jalap, colocynth, scammony, &c., are prescribed in vain in hippiatric practice. It is true, if we look into works on farriery, we in general shall find *formulæ* for cathartic balls containing some one or more of the ingredients I here set down as inert. Most of these "valuable recipes," however, will be found to have, as one among their constituents, *aloes* entering into their composition, in which—and which *alone* I may in most, if not in all, instances, safely affirm—consists any purgative virtue they are found to possess*. To shew of what early date the use of aloes is in veterinary medicine, and, at the same time, how well its cathartic qualities were known even a couple of centuries ago, I need only quote a passage or two out of Solleysell:—"Aloes," says this profound practical veterinarian, "is *usually* made the *base* of purging balls;"—— "for if you can procure fine and clear aloes it will purge your horse certainly and safely; and I know no better purgative than this, nor any so agreeable to the nature of a horse." The same admirable author's observations on purging medicines are no less in accordance with that knowledge which past experience has put those of the present day in possession of. "The administering of purging medicine to a horse is one of the *hardest* parts of a farrier's task†; and therefore I thought myself obliged to use the utmost diligence and application to find out a safe and successful method of purgation: but, notwithstanding all my endeavours to

* Take the recipe "No. 1," of Taplin, as an example:—

Take of Socotrine aloes	an ounce
India rhubarb	two drachms
Jalap and cream of tartar, each . . .	one drachm
Ginger (in powder)	two scruples
Essential oil of cloves and aniseed, each .	twenty drops

Syrup of buckthorn sufficient to form the ball.

Taplin's Stable Directory.

† By "hardest" Solleysell here means that part of the farrier's practice of medicine attended with the *most risk*.

prevent the inconveniences that attend the use of these medicines, I observed *an extreme repugnancy in the nature of horses to yield to their operation*, and I found by experience that *purgative remedies are succeeded by such universal disorder in the economy of nature*, that the horse cannot be *restored to his temper* for a considerable time afterwards."——"*I have seen more horses than one killed by purging remedies* that had been successfully administered to others, *for want of a due preparation of their bodies*, &c."—— "I never purge a horse without fear." Such being the danger, however remote, by nature inherent upon the operation of catharsis in horses, Solleysell expresses his hopes that "some persons of greater judgment and authority will undertake the reformation of medicine by *extirpating all purgatives*, and *substituting some powerful diaphoretics* in their stead," &c. "However," continues our author, "I thought myself indispensably obliged to inquire into the safest methods of purging horses;" and accordingly he did so, and found "the best to be a mixture containing a pound and a half of olive oil, five ounces of the pulp of coloquintida (colocynth), an ounce and a half of flower of linseed," &c. The aperient virtues of olive oil, therefore, and of linseed too, were known to Solleysell, and he considered these safer, because milder in their operation, than aloes. How all this trips us up in our present ("improved") practice! Does not many a veterinarian at the present time exhibit *ol. olivæ* in cases where he requires a milder and quicker cathartic than his common purging mass will furnish him with? After all, however, for general or ordinary purposes we are, as it were, driven to the aloe plant: nothing else in nature with which we are acquainted will produce the same *uniform, certain, and safe purgation;* and therefore no person—not the surgeon even—can have equal interest with ourselves in the cultivation of this plant, and in the preparation of its products. In the pharmacy of the surgeon, although the aloe may be acknowledged to be a serviceable drug, yet is it one in whose place another might on most, if not on all, occasions be substituted; whereas, in the veterinarian's pharmacy, ALOES holds the highest place—stands indeed, almost, in point of importance, in a place by itself.

What the peculiarities of susceptibility—what the *idiosyncrasies*,

characterized by Solleysell as "the extreme repugnancy in the nature of horses to yield to the operation of purgatives"— may be which admit the bowels of the horse to be purged freely and readily by aloes, and yet refuse their being acted on by any of the numerous agents that take the like effect on our own bowels, I am not now about to inquire: I would simply, *en passant*, allege as one apparent cause for such opposite results the differences of construction of the alimentary passages in horses from those in men, in ruminants, &c.; and when we come to consider these differences, and make due allowance for them in respect to function, we shall not have occasion to express so much surprise that the same cause, operant upon both, should produce dissimilar effects. Salts and senna and jalap and rhubarb make their first impression upon the *stomach*, and the brunt of their subsequent operation falls upon the *small intestines*. Now, in horses, we know that all fluids, and many solids—medicines, perhaps, among the number—pass through the stomach quickly, if not at once, into the small intestines, and from thence rapidly onward into the large intestines, which, in the equine species, may be regarded as kinds of secondary stomachs; consequently, medicines whose operation is known to be especially on the *primary* alimentary passages, are not likely, in the horse, to prove of much avail. Aloes, we know, is noted for its effect on the *lower* or *posterior* bowels, on the cæcum and colon in particular; hence, perhaps, its especial efficacy as a horse medicine.

The late Professor Coleman was in the habit, in his lectures, of insisting that purgation was a widely different thing in horses from what it was in man; and, with the view of exemplifying this, reminded us how a man might be made to purge in the course of a couple of hours by medicine, whereas, in the horse, the same operation required in general a period of four-and-twenty hours. His *data*, however, were dissimilar, and consequently the inferences he deduced became irreconcileable. The man takes a dose of some *neutral salt* or of *castor oil*; the horse takes ALOES. Did the man take aloes, we should not find his bowels acting in two, perhaps not in twelve hours afterwards, and we know that every now and then it happens that aloes will purge a horse in a dozen hours.

Again; the man, though he purge from aloetic medicine in ten or twelve hours, will probably not cease to feel annoyed by his dose for the subsequent ten or twelve hours. It is common to say, a dose of physic engages a horse for three days: the first, in his taking it; the second, in its operation; the third, in its setting. And certainly, where all such advisable precautions are taken, this constitutes the period required for putting a horse through a dose of cathartic medicine, proving it to be a much longer and more serious affair altogether than what it is in a man. This period, however, may be materially shortened, and the inconvenience sustained by the animal being thrown out of employ thereby very much diminished. I remember an admirably shaped old chestnut horse, a present to Coleman by the late Lord Heathfield, to which the Professor used to give—by way of a dose of physic—three drachms of aloes in the morning, and afterwards drive the horse to Woolwich and back, altogether about two or three-and-twenty miles: by the time he returned, or soon after, the Professor used to find the physic operating, its operation continuing perhaps during the night, and the next (the second) day it was setting, and, therefore, was not incapacitating the animal from continuing his work: such another (long) drive as he had had on the first day, however, would certainly not have been recommendable; that might have brought on more purgation than was either pleasant to his master or safe to himself.

In medicine, we are in the habit of making three distinctions in the aloes as they reach us, as exports from the native countries of the plant: we call the extracts *Socotrine*, *Barbadoes*, and *Cape*. The two latter are the kinds known in veterinary medicine, some regarding them as the products of distinct species of the aloe plant, others as the products of the same plant modified in their aspect, and somewhat in their qualities, by the presence of water. Those who look upon the extracts as the juices of distinct plants, inform us that Barbadoes aloes are obtained from the *aloë vulgaris*, cultivated extensively in the island of Barbadoes, as well as in Jamaica; and that Cape aloes issue out of the *aloë spicata*, indigenous in the Cape of Good Hope. A good deal has been said and written by veterinary people concerning the relative efficacy,

as cathartics, of Cape and Barbadoes aloes: supposing, however, that both drugs are *good* of their kind, and that the subjects to which they are administered are as near as can be alike in respect to preparation and susceptibility of being acted on by medicine, the differences between Cape and Barbadoes aloes are more imaginary than real. By my father, who was for thirty years the Senior of the Veterinary Department of the Ordnance—there being at one period of time eleven other veterinary surgeons in the same service—hundreds of weights of aloes, and ALL *Cape*, were used and issued, without on any occasion, save when the drug was in itself of *bad quality*, there being any complaint made of inefficacy or insufficient action. For my own part, I have for these ten years past—with the view of testing their relative strengths—kept cathartic masses composed both of Cape and Barbadoes aloes in my pharmacy, *prepared exactly in the same manner*, in separate jars—one marked "MASS. CATHARTIC. C.;" the other, "MASS. CATHARTIC. B.:" and the only difference in their efficacy I have in the course of this long period been able to detect is, that the BARBADOES is, about in the proportion of *a drachm to the ounce*, "stronger" than the CAPE. I can, therefore, only repeat, that would practitioners make allowances for the *form* in which aloes is given, and the *circumstances* under which it is given, and at the same time pay attention to the *quality* of their drugs, much, most, or all indeed, of such conflicting testimony would fall to the ground.

A very useful form in which aloes are exhibited is the *aperient*. In the beginning of febrile disease, when the fever is increasing and the bowels are confined, an aperient dose of cathartic mass has two beneficial effects: in the first place, shortly after being taken, it nauseates the patient, rendering him less disposed than perhaps he was before to take food, and the following day it brings his bowels into that state—the laxative—which we consider most favourable to the welfare of our patient; the effect of the aperient on the bowels being perfectly within our control, either on the one hand admitting of being promoted by enemata, or, on the other, of being restrained by abstinence from water and mashes, and substituting, in lieu thereof, gruel, or linseed tea, and a more solid

aliment. Were we in possession of some mild, readily and easily-acting aperient, we probably should not think of having recourse to (what surgeons would call a drastic and an irritating one like) aloes; but, since we have it not in our power to nauseate by antimony or ipecacuanha, nor to purge with neutral salts, castor oil, or senna, we must by other means do our best to bring about the same ends; and, for my own part, I do not know any thing that will so well answer that purpose as our ordinary cathartic mass.

I am not an advocate myself for exhibiting aloes in very small doses at stated intervals—three or four times within the twenty-four hours—in bronchitic, pleuritic, or pulmonic affections, with the intention of creating and continuing a state of nausea, and of moderately opening the bowels and promoting the urinary discharges. Aloes is a cumulative medicine, and one that will—as most medicines are found to do—take a much greater effect, in proportion to the actual quantities taken, in small or divided doses than in one single administration; and thus it too often happens, when exhibited in this divided form, that purgation sets in unexpectedly, and that we find ourselves unable to suppress it; or that we do so at considerable risk, in consequence of the repetition of excitement the mucous membrane has been, and still continues to be, subjected to.

ACONITE, MONK's HOOD, OR WOLF's BANE.

(Aconitum Napellus.)

This exotic plant, a native of the northern parts of continental Europe, common enough now-a-days in our own gardens, where it has become quite an ornamental flower, has a reputation of very ancient date for being highly poisonous to man; a character fully sustained by it in modern times, by the extraction from the roots and leaves of it, of an alkaloid essence, by the name of *aconitina*, of so deleterious a nature that, according to an account contained in Mr. Phillips' Translation of the London Pharmacopeia—into which ACONITINA is now introduced—"the 50th part of a grain dissolved in spirits of wine killed a sparrow in a few minutes, and the 20th

part instantly. Applied to the eye, it occasions a temporary dilatation of the pupil."

In the year 1803, a horse having a chronic (glanderous) affection was subjected to the influence of aconite. In the first instance two drachms of the plant were given*, and the same dose was daily, for four days, repeated. On the fifth, half an ounce was given. On the sixth, the half-ounce was given morning and evening. On the seventh and eighth days the same dose was exhibited thrice, with the effect, as it was thought, of some augmentation in the urinary discharges. On the ninth day the aconite was given in the dose of an ounce thrice a-day; and these large doses were continued morning, noon, and night, for the four successive days, without any perceptible effects.

MOUNTAIN ARNICA OR LEOPARD's BANE.

(*Arnica Montana.*)

In October 1812, to a chestnut horse, having ulceration in the near side of his nose, with discharge from the corresponding nostril, without any enlargement of the submaxillary glands, half an ounce of the flowers of the arnica were given twice a-day, which dose was on the three following days doubled, trebled, and quadrupled, without effect. By way of a finale, on the fifth day, fifteen ounces were administered at one dose, and still no result.

ARUM OR WAKE ROBIN. (*Arum Maculatum.*)

Case I.—*September*, 1812, to a glandered horse, shewing signs of farcy in his legs, two drachms of the recent root of common arum were given in ball twice a-day, chlorine at the same time being liberated under his nostrils, which were both ulcerated, and profusely discharging. On the third day the dose was augmented to half an ounce. On the fifth, the patient took an ounce morning and evening. This produced symptoms of fever, much increased

* I imagine the *leaves* were the part of the plant used.

his pulse, and took him off his appetite. Next morning, an involuntary spasmodic sort of twitching of the muscles of various parts was observed, particularly of the side. On the seventh day, his appetite having returned, one dose of an ounce was given. Eighth day, one ounce and a half morning and evening. Ninth day, found purging very much, and exceedingly ill, in appearance, from the medicine, though free from pain. Tenth day, died suddenly and unexpectedly.

CASE II.—*October*, 1812, a remarkably large, healthy-looking, strong bay-horse, five years old, in fair condition, having a small ulcer visible within the off nostril, from which there is some discharge, with enlargement of the submaxillary lymphatic gland of the same side, was subjected to the action of recent arum root.

1*st day*.—An ounce was given.

2*d*.—Repeat the ounce-dose twice a-day.

3*d*.—Give nine drachms twice a-day.

4*th*.—Refuses all food—pulse 60, and small—heaves slightly at his flanks, and is tucked up—extremities cold: for all this, however, the horse has a sprightly look, evinces nothing like nausea, nor are his bowels affected, his dung being in hard balls.

5*th*.—A rowel was inserted under his jaw, but no medicine given—he still continuing off his feed.

6*th*.—Let him take half an ounce, boiled in oatmeal gruel.

7*th*.—The drench has taken him again off his feed.

8*th*.—Hangs his head, looks dejected, but his countenance expresses no pain, nor is there any sort of uneasiness about him.

9*th*.—Repeat the drench morning and evening. A strange morbid granulative action appears in the ulcers in the nose; the granulations from them are rising beyond the level of the surface, and have a blackish aspect: the discharge is diminished.

10*th*.—Continue the drench morning and evening.

11*th*.—The appetite is improving: the ulcers have run into one common sheet of ulceration. To take his drench thrice a-day.

12*th*.—Use six drachms of the arum in the decoction.

13*th*.—Two ounces of the arum to be boiled in each drench, and given twice a-day.

14*th*.—Our stock of medicine is exhausted. Latterly it seems to have been, in the form and doses in which it has been administered, all but devoid of effect.

THE SPANISH FLY. *(Cantharis Vesicatoria.)*

Cases I. & II.—Spanish flies were first given to horses by way of experiment, under the direction of Mr. Coleman and my father, so long ago as 1801. Two horses having subacute glanders were the subjects of the first experiment, the symptoms in neither of them being urgent. They commenced taking (the large doses of) two drachms of the powdered flies daily. On the sixth day, in one of them, alarming symptoms presented themselves: all appetite had forsaken him; he manifested on a sudden excessive prostration of strength, broke out in violent perspirations, had no pulse to be felt, and speedily sank and died.

The other horse, on the day following, was attacked with similar alarming symptoms, of which he likewise sank and died. Both subjects were observed to pass, during the time they were taking the flies, large fluxes of urine.

The post-mortem appearances were—kidneys (though expected to be found changed) not observably altered in aspect; bladder in a highly vascular condition, and particularly so in the horse that died last, with its cavity contracted to that degree that its sides were in contact, and it appeared less in volume than in the ordinary empty state in health. In the longest survivor the stomach likewise presented marks of inflammation, though not of that intense character exhibited by the bladder.

In some subsequent experiments with cantharides, their action appeared, to my father, to be principally on the bladder.

Case III.—In this instance a decoction of cantharides was given—made by boiling an ounce of the powdered flies in a pint and a half of water down to a pint—to a mare having a muco-purulent flux from her nostrils, with some remains of submaxillary tume-

faction, in the dose of two fluid ounces, morning and evening, in a pint and a half of infusion of linseed.

August 11*th*, 1824.—The doses given yesterday have not affected her appetite. To-day the enlargement underneath the jaw is blistered, and the drench is repeated morning and evening.

12*th*.—The nasal flux appears thicker. Continue her medicine. Five o'clock, P.M.—The mare has, since the morning, grown dull and seems unwell; though her pulse is not quickened, and she has eaten the hay and corn given her at noon. Omit her dose this evening.

13*th*.—She has not eaten during the night more than half of the food that was given her yesterday evening. She is now evidently uneasy, making frequent efforts to stale, and a little urine now and then passes in the attempt. Her pulse, however, continues unaffected, and, though she did not eat above half the food that was given her this morning, she drank a pailful of water: not ordinarily drinking so much. A cathartic ball was given.

15*th*.—Her bowels have been cleared out, and she appears free from vesical irritation. Let her take her drenches as before.

16*th*.—She has failed in her appetite, manifests general languor and depression, and is tucked up in her flanks. Discontinue medicine.

20*th*.—The mare has considerably lost flesh; though she has again recovered her appetite, and has experienced within these two days past amendment in her general health and aspect. Let her try to take her medicine again.

27*th*.—Since last report she has continued taking her drenches without impairment of her appetite; and the effect appears to have been, considerable diminution in the nasal discharges, a turning white of them, and a loss of a fetor they before possessed. The submaxillary tumour is also lessened.

31*st*.—Up to yesterday we thought the mare was gradually losing her nasal defluxion. Yesterday, however, it increased a little; to-day there is further augmentation of it, and it has acquired a yellow tinge.

Sept. 5*th*.—She has continued regularly taking her drenches since last report, without any perceptible amelioration in respect to her

complaint, and without any disturbance of her appetite and general health.

10*th*.—She has remained without medicine since the 5th, and during the interval the mare has again shewn improvement. The nasal flux has sensibly diminished; indeed, at times, has been suspended altogether: also the enlarged gland under the jaw is again diminished. Her appetite is now very good, and it is only at such times as she snorts or blows that any quantity of discharge is ejected from her nose. There seems no doubt about the seat of the disease being the *sinuses* of the head.

CINCHONA BARK—QUININE.

BARK is on occasions given to horses, either as a *tonic* or an *astringent*. In man, cinchona is known to create and improve the appetite, aid the operations of digestion, and give strength to those of the vascular system; and to horses, now and then, it is exhibited, oftener by some veterinary practitioners than by others, with similar views. Large quantities of bark have been likewise given by my father and other veterinary surgeons in glanderous affections, but without any discoverable benefit. I have sometimes given bark in malt liquor, in porter, to horses debilitated by previous disease, and with manifest advantage. I have also occasionally used bark—either by itself or in combination with opium—as an astringent in certain stages of diarrhœa.

QUININE I have likewise prescribed, in drachm doses, twice or thrice a-day; but with no perceptible advantage over bark that I could discover: added to which, its comparatively high price is an objection to its coming into any thing like general use.

CAYENNE PEPPER*.

CUBEB PEPPER*.

* For accounts of the effects of these peppers, and for the doses in which they have been given to horses, see the author's "Hippopathology," vol. iii, section xviii, p. 341.

COCCULUS INDICUS.

THESE berries being said to be in extensive use in breweries, in order to give an intoxicating property to beer, and bearing the reputation, in certain quantities, of being poisonous to animals generally, I felt very desirous, some years ago, to ascertain what their effects might be, when administered to horses, and whether or not they would turn out, medicinally, of any service in glanders.

About this time (1821) a chestnut horse, six years old, with cataracts in both eyes, and labouring under symptoms of glanders, was sent to my father, to "cure, or have destroyed:" knowing that he was unable to perform the former, and yet, from the age and condition of the horse, unwilling to put him to death, he was consigned to me for experiment. The horse commenced taking the cocculus (in combination with potash) on the 3d April, in half-ounce doses thrice a-day, and continued the same up to the 28th of the month (twenty-five days) without any other effect than occasional symptoms of dulness and feverishness, the disease all the while making steady and, latterly, more rapid progress.

ELATERIUM.

I NEVER exhibited this potent medicine to horses: I have given it in two instances to dogs; and the effects proved much the same as in the human being.

August 16, 1822.—A terrier bitch (named Flirt) of my own, received a blow upon one of her eyes, occasioning swelling and redness of the eyelids, and perfect opacity of the cornea. I offered her a lump of fat in which was buried a grain of elaterium. She greedily ate it. In two hours afterwards she vomited, ejecting a quantity of chymous matter, with which it was imagined must have been mingled the whole or the greater part of her medicine. However, four hours afterwards, she passed a copious liquid evacuation *per anum*, some hardened fæces having come away before it. Afterwards she was freely purged, and derived much benefit from it.

August 17, 1822.—The same dose was given to another bitch—Busy—the property of Gen. M——d. An hour afterwards she vomited; and this was succeeded by moderate purgation.

EUPHORBIUM.

THIS acrid gum-resinous substance was administered by me in December, 1812, to a horse having glanders. It was first given in infusion, mingled with large quantities of water: in the course of a few days, however, it inflamed the mouth, excoriated the lips, caused copious discharges of saliva, and made the animal—it was thought on this account—off his feed. It was, therefore, afterwards exhibited in balls—half an ounce of the powders being given twice a-day. For two days he took these (half-ounce) doses, and on the third, two doses of an ounce. On the fourth day his appetite had become lost, apparently from the inward effects of the medicine, and diarrhœa had set in, which was followed by great depression, and soon, also, gave rise to remarkable hollowness of the flanks. On the fifth day, still no appetite, with diarrhœa increased in violence, and yet without any noticeable expression of pain. On the night of this day he died, exhausted by his diarrhœa, exhibiting signs of irritation, not even now amounting to any manifestation of acute pain.

I also experimented, the same year—1812—on the efficacy of euphorbium as a vesicatory, it being an object, about that time, in consequence of the high price of cantharides, to obtain a substitute for it. Although, however, vesication was produced by it, and in combination with ammonia and the bi-chloride of mercury this effect was rendered more impressive and durable, still it was so manifestly inferior, as a pure unstimulating vesicatory, to the cantharides, that after several experiments its use as a blister was abandoned.

GAMBOGE. *(Cambogia Siamensis.)*

VARIOUS trials have been made of gamboge as a cathartic for horses; but though, on occasions, comparatively small doses have been found to have this effect, yet at other times large doses have failed in producing purgation, and in lieu thereof have occasioned a good deal of irritation and annoyance in the bowels, accompanied, in some instances, by rigors and other alarming constitutional disturbance.

August 27, 1823.—To a bay horse, being in perfect constitutional health, but having on him some gleety flux from the nose, two drachms of powdered gamboge, made into a ball with linseed meal and treacle, were given at 10 o'clock, A.M. Next morning, about the same hour—consequently twenty-four hours from his taking the medicine—while out at walking exercise, he purged five or six times, and continued so to do, rather profusely, for the remainder of the day. On the morning of the 29th he passed dung still thinner in consistence than common cow-dung. Indeed, altogether, we should have imagined that an ounce of Barbadoes aloes would hardly have had greater effect.

Desirous of ascertaining to what extent the same horse might prove susceptible of the operation of aloes, on the 2d of September following—his bowels having, in the interim, quite recovered from the effects of the gamboge—he took half an ounce of Cape aloes. Next morning he purged briskly, and continued purging on the following morning: shewing that his bowels were, at all events at this time, more than ordinarily susceptible of the operation of cathartic medicine.

On the 29th August of the same year, to a horse under treatment for a sore heel, a drachm and a half of gamboge was given, in ball, with meal and treacle. In the evening he loathed his food; but experienced no purgation, neither on the following day nor afterwards; and yet his appetite did not for several days afterwards appear quite restored.

On the 30th of August, two drachms of gamboge, in solution, were administered to three horses, one having a cold, another

ophthalmia, and a third being lame. Next morning, twenty-four hours afterwards, not one of them shewed any signs of purgation; and in consequence of its being Sunday morning they were not taken out to exercise. At one o'clock, P.M., twenty-seven hours after the administration of the medicine, one horse out of the three purged sparingly, and did not feed with his wonted appetite. The other two remained unaffected by the medicine.

September 1st, 1823.—One horse having a mangy affection, another suspected of being glandered, and a third having a contusion of the spine, took, each of them, a ball composed of three drachms of gamboge, meal, treacle, and oil of caraway. At ten o'clock the same night it was observed that two of them had loathed their evening feed. Next day, no other effect was apparent than impairment of appetite, and unusual dulness about these two horses, with evident tucking-up of their flanks. In fine, the medicine, though it had not purged, had evidently annoyed two of them a good deal.

By my father, three drachms of gamboge were administered, in ball, to a horse having farcy-glanders, on two days in succession. On the third day the animal was seized with great prostration of strength, had great difficulty in rising out of the recumbent posture, and had no pulse perceptible. From these alarming symptoms, however, in the course of a few days the horse recovered; and being then in the worst stages of farcy and glanders, was destroyed. His stomach presented marks of intense inflammation, and upon its surface were found streaks of blood.

I have heard it said that gamboge, combined in certain proportions with aloes, add to their cathartic efficacy, and that druggists who compound horse medicines are in the habit of making such additions. It is not, however, a practice for the veterinarian to pursue, being one hardly exempt from danger.

MEZEREON. *(Daphne Mezereum.)*

THE effects of this plant, remarkable for its acridity, are upon horses of so active and irritant a nature that, pushed to extremes, it operates as a poison.

December 5th, 1812.—To an aged horse, poor in condition, having acute glanders, without farcy, an ounce of mezereon bark was exhibited twice a-day, in balls. Having persevered in his balls to the 8th, on that day he was somewhat off his feed; still, however, the balls were given, and again on the 9th. On this day he purged triflingly, and was too much off his appetite to allow of taking more medicine: indeed, towards the latter part of the day he lay down and appeared very unwell. Pulse 70, which by night had increased to 90, and was accompanied by profuse diarrhœa, pain in the bowels, prostration of strength, and death, which happened at one o'clock on the following morning.

On the next occasion it was agreed the doses should be reduced: accordingly, on the 29th February 1813, to a bay horse that had been treated for catarrh which terminated in glanders, a drachm of mezereon bark was given twice a-day. This was continued to the 5th of March, on the night of which day he evinced unusual dejection, refused his food, and lay down in his box. Next day but half-drachm doses were given; and on the 7th, on which day he took his half-drachm ball thrice, he evinced signs of purgation. On the 8th, however, his dung proved firmer, and his appetite improved. He continued his reduced ball thrice. On the 9th appetite and bowels had both again given way; on which account the ball was given but twice daily. On the 12th the bowels recovered their tone, and the appetite again became tolerably good. On the 18th the appetite once more failed. On the 19th the balls were resumed; but on the 20th the appetite proved too much interfered with to admit of their continuance. On the 22d diarrhœa set in, accompanied with symptoms of pain in the bowels, and considerable constitutional irritation, which ended at ten o'clock on the night of the 23d in the animal's death.

POISON OAK OR SUMACH. *(Rhus Toxicodendron.)*

Sept. 15, 1812.—To a horse in a violent stage of acute glanders, shewing spots of ulceration upon both sides of the septum nasi, and having the submaxillary glands upon both sides in a state of enlargement—notwithstanding all which, however, save that he was in low condition, he appeared pretty well in his general health, feeding well, &c.—but as yet having no symptom of farcy, was given ℥j of the leaves of the plant, made up into balls, twice a-day.

16*th.*—℥ij twice a-day.

17*th.*—In consequence of some failing in his appetite, the dose to be reduced to ℥ss twice a-day. And in consequence of his legs swelling, he is to be taken out, morning and afternoon, for walking exercise.

18*th.*—His appetite having returned, the dose is increased again to ℥j twice a-day.

19*th.*—℥ij twice a-day.

20*th.*—His appetite again affected. Continue the ℥ij balls.

21*st.*—Notwithstanding the ℥ij doses have been persevered in, his appetite has recovered; therefore now give ℥iij twice a-day.

23*d.*—℥iv twice a-day.

24*th.*—℥iij twice a-day. The stock of the medicine being exhausted, the dose is necessarily reduced.

$2\frac{3}{4}$lb have been taken in ten days, and the only visible effect such large doses have produced is impairment of the appetite; until latterly, when soon after taking his medicine, he has exhibited symptoms of giddiness in the head, and while at exercise was reported by the man who rode him to stagger about.

STAVESACRE. *(Delphinium Staphisagria*.)*

THORNAPPLE. *(Datura Stramonium.)*

Nov. 2, 1812.—A chestnut horse, glandered, but in good working condition, and with good appetite, commenced taking ʒj twice a day of the dried leaves of stramonium.

3*d.*—Dose augmented to ʒij twice a-day.

4*th.*—ʒiv twice a-day.

5*th.*—Yesterday's large doses have taken away his appetite. Nevertheless, they are repeated to-day.

6*th.*—Refuses all food; is dull, and appears very unwell. The stock of medicine being, however, unfortunately expended, I am unable to prosecute the experiment.

TOBACCO. *(Nicotiana Tabacum.)*

In the month of January 1805, there arrived at Woolwich ten horses which, on examination by my father, were found confirmedly glandered. It was recommended that tobacco be made trial of in the form of fumigation: accordingly, a fumigating apparatus was procured, and they were all submitted, morning and evening, to its operation. After a week's fumigating, in three of the cases there appeared abatement of the nasal discharges. The discontinuance, however, of the fumigation for a few days was followed by their return in the same profusion as before. This was the only observable effect the fumigation had on their disorder.

The symptoms produced by the fumigation, more remarkable in some than in others, were, disturbed respiration, increasing in some cases to apparent signs of suffocation, giddiness, and stupor; the appetite was not affected, neither were the operations of the kidneys or bowels disturbed.

* For the effect of stavesacre on glandered horses, consult the author's "Hippopathology," vol. iii, p. 340.

The fumes of tobacco are at the present day employed with striking advantage in cases of obstinate constipation from colic, &c.

An infusion of tobacco is used as a dressing for lousiness, and an excellent one it is. But for mange it is manifestly inferior to the *unguent. picis liquidæ.*

VALERIAN. *(Valeriana Officinalis.)*

December, 1812.—Two ounces of the root of valerian were administered to a horse condemned for glanders, without effect. Next day the same quantity was given, as before, in balls, morning and evening; and the day following, like doses were repeated, without even disturbing the animal's appetite. On the fourth day six ounces were given; still no effect.

VIRGINIAN SNAKE ROOT. *(Aristolochia Serpentaria.)*

November 6, 1812.—It was desired to know whether snake root would take any diaphoretic effect on a horse condemned to be shot on account of having glanders. An ounce was given in ball thrice a-day, and he was warmly clothed.

7*th.*—The medicine he took yesterday has made him loathe his food.

8*th.*—In addition to want of appetite, he has a difficulty in passing his urine; but no diaphoretic effect has been observed. He is much tucked up in his flanks. At night alarming symptoms made their appearance.

9*th.*—Found dead this morning in his box.

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